Fortress



American Civil War Fortifications (1)

Coastal brick and stone forts

A Konstam • Illustrated by D Spedaliere & S S Spedaliere

Fortress • 6



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Artist's note

Our sincere thanks to all who have helped in the preparation of this book, especially to Marcus Cowper and to the author, Angus Konstam, who followed, supported and encouraged us all along the way. We would like to dedicate this book to our dearest daughter Alina and to Lior and Rani, her wonderful cousins. Readers may care to note that the original paintings from which the color plates in this book were prepared are available for private sale. All reproduction copyright whatsoever is retained by the Publishers. All enquiries should be addressed to:

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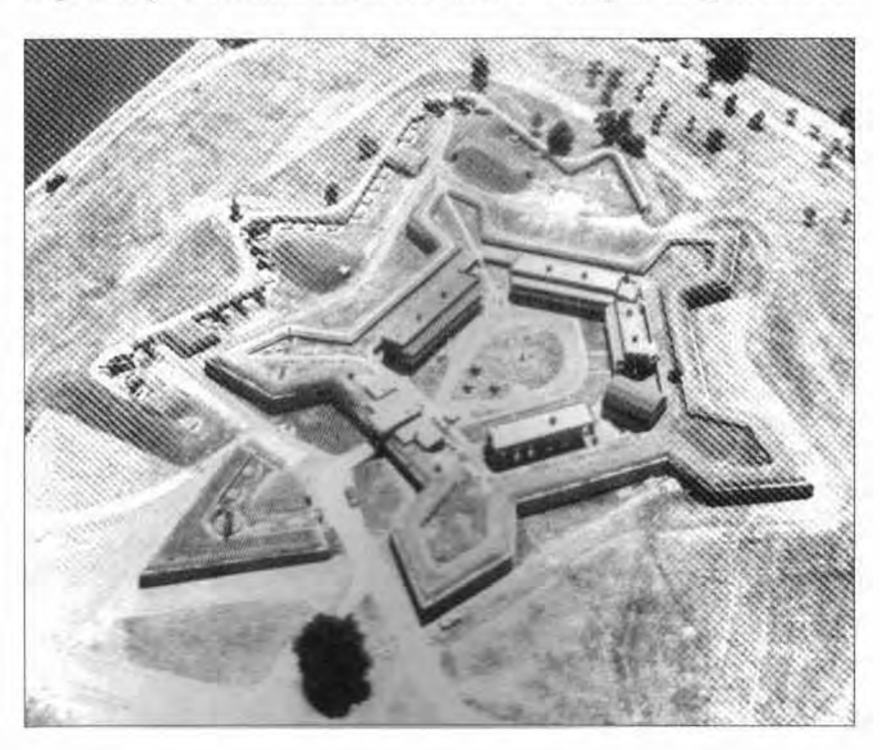
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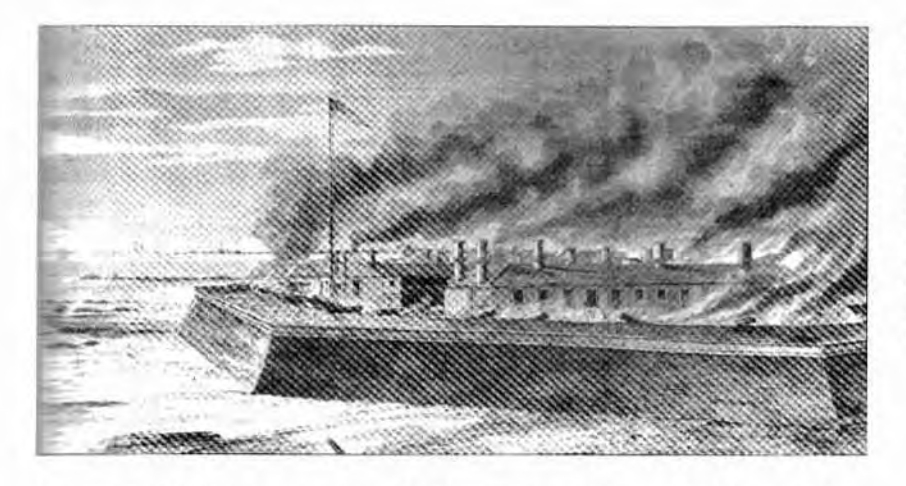
During the late 18th century, the newly created United States of America was vulnerable to foreign attack on her two land frontiers, one with Canada and the other with Spanish Florida, and along the Atlantic seaboard. There was no secure western border to the 13 states, only a vaguely defined western territory occupied by tribes of Native Americans. Although the Spanish were never considered to be a significant military threat, the Canadians were, and a string of small forts was constructed to guard against invasion from the north. The long exposed seaboard of the United States was a source of constant danger. While Great Britain was clearly the foreign power that posed the greatest threat, France and Spain were also deemed potential adversaries, despite the alliance of both countries with the rebellious American colonies during the Revolutionary War.

In 1790, Congress commissioned the first nationwide survey of coastal defense in an attempt to determine the most important strategic locations along the Atlantic seaboard. In early 1794, this initial investigation was followed by the launch of the country's first program of coastal fort construction. Initially, this was restricted to the construction of fortifications that could protect vulnerable harbors, but this was soon expanded to encompass other strategic points along the American shore. So began the first of a series of coastal defense programs that would continue, with only brief interruptions, for the next 160 years.

The development of these coastal fortifications is important for several reasons. Their creation and expansion serves as a record of the perceived threat to American national security during this century and a half, while also emphasizing the defensive nature of American military thinking for much of



Fort McHenry was first built around 1800 to defend Baltimore Harbor, and became famous in 1813 when it resisted a furious British bombardment. The action inspired the composition of "The Star Spangled Banner." Third System-era outer works augmented the initial five-pointed Second System fortification. (Clyde Hensley Collection)



Fort Moultrie, South Carolina, was built on the site of the Sullivan's Island fortification made famous during the British attack on Charleston Harbor in 1776. The headquarters of the First U.S. Artillery Regiment, the fort was abandoned in December 1860, when its Union garrison withdrew to the more defensible Fort Sumter. The fort was set on fire to prevent its stores falling into secessionist hands. (Stratford Archive)

this period. With the exception of the Spanish–American War of 1898 and the two World Wars, the pursuit of defensive and isolationist doctrines dominated the strategic thinking of the United States until the mid-20th century. This is understandable as in the century between 1794 and 1898 the country expanded its western borders as far as the Pacific Ocean, spanning the continent of North America. The formal acquisition of the North West Territory by treaty in 1783 and the creation of Tennessee in 1796 were followed by the even more dramatic Louisiana Purchase (1803). Increasingly, the preoccupation of the American military was with the pacification of the west, but this westward expansion beyond the Mississippi River also led to the extension of the length of coastline that needed to be defended against potential foreign invasion. Strategically, this meant that while the army was busy in the west, fortifications were needed to protect the East Coast.

A quick glance at a map of the Atlantic seaboard shows the scale of the defensive problem facing American military engineers. Initially, 33 fortified sites were selected, and by the beginning of the War of 1812 between the United States and Britain, many of these were in operation. Compared to the stone fortifications encountered a half-century later, these were usually relatively small fortified structures, serving more as a deterrent than as a serious barrier to seaborne attack. During the War of 1812, the three fortified sites in Maryland did little to prevent the British from landing the force that captured and burned Washington. Consequently, military planners re-examined the system, and the number of coastal forts from Maine to Georgia was reduced to 18 heavily fortified sites. In addition, the acquisition of Florida (1819), and the creation of Mississippi (1817) and Alabama (1819) ensured that more forts had to be built along the Gulf of Mexico, as well as the Atlantic coast of Florida.

The changing technology of warfare throughout the period meant that these fortifications needed to be stronger and better armed than before, and Congress authorized the expenditure of millions of dollars on the construction of a string of imposing brick-built fortifications from Maine to Louisiana. The problem with the construction of these large expensive defenses was that changes in the design of warships and ordnance took place at a faster rate than improvements to the design and construction of coastal fortifications. Also, these structures were designed to defend against attack by a foreign power. It is ironic that for many their first, and only, exposure to attack came at the hands of their fellow countrymen. When the arguments over slavery and states rights led to the secession of 11 states in 1861, the tiny garrisons of several of these coastal forts found themselves under siege. Indeed, the opening shot of the American Civil War was fired against Fort Sumter in Charleston Harbor on April 12, 1861. During the following months and years, the effectiveness of these stone-built fortifications would be tested in the crucible of war.

Chronology

1783	The United States of America formally gains its independence
1794	War Scare caused by the French Revolutionary War
1794–1804	Development of the First System of Coastal Artillery
1799–1800	"Quasi War" between the United States of America and France
1807	The *Leopard* Incident creates prospect of war with Great Britain
1807–1814	Development of Second System of Coastal Artillery
1812–15	The War of 1812 between the United States of America and Great Britain
1816	Formation of the Bernard Board (Board of Engineers for Fortifications)
1817–1867	Development of the Third System of Coastal Artillery
1821	First Report of the Bernard Board
1844	Introduction of the columbiad system of seacoast artillery
1846–48	Mexican–American War
1860	**November:** Abraham Lincoln elected President **December:** South Carolina secedes from the Union Fort Moultrie seized by Confederate militia Fort Sumter secured by Federal garrison
1861	**January:** Secession of Georgia, Florida, Alabama, Mississippi, Louisiana and Texas from the Union Forts Pulaski, Marion, Jackson, St. Philip, Morgan, Gaines, Pike, Barrancas and McRee seized by Confederate militia Forts Zachary Taylor, Pickens and Jefferson secured by Federal garrisons **February:** Creation of the Confederate States of America **April 12:** Confederate gunners fire on Fort Sumter **April 14:** Fort Sumter surrenders **May:** Virginia, North Carolina, Tennessee and Arkansas secede from the Union Forts Macon, Caswell and Johnson seized by Confederate militia Fort Monroe secured by Federal garrison
1862	**April:** Siege and surrender of Fort Macon, North Carolina Battle of New Orleans, and surrender of Forts St. Philip and Jackson, Mississippi Siege and surrender of Fort Pulaski, Georgia
1863	**April:** Abortive Union attack on Fort Sumter
1864	**August:** Battle of Mobile Bay, and surrender of Fort Morgan
1865	**February:** Fall of Charleston. Union troops occupy Forts Sumter and Moultrie **April:** Surrender of the Confederacy and end of hostilities
1867	Suspension of funding for the masonry fort program.

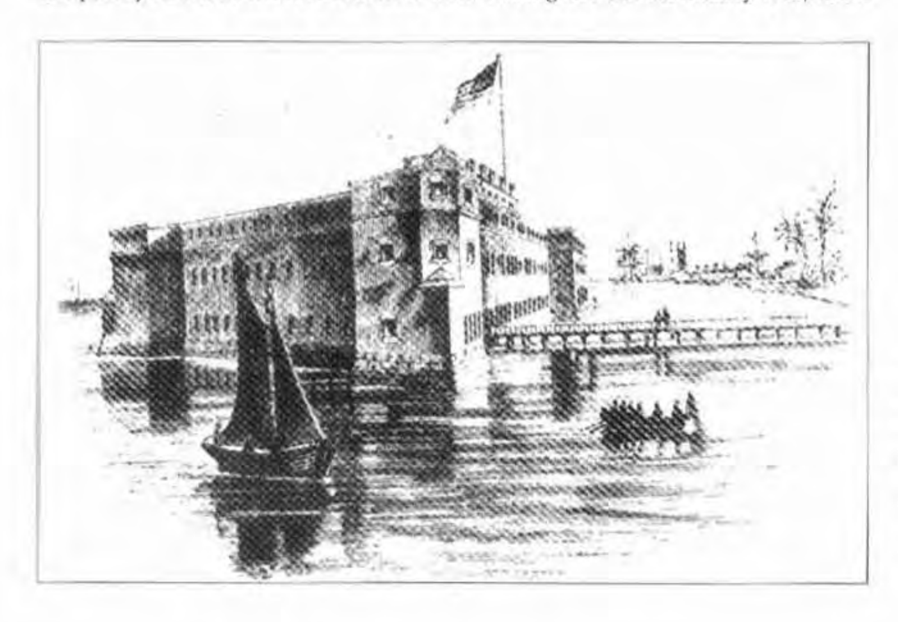
The development of American coastal fortifications

The First and Second Systems of coastal fortification

The fortification of American ports began long before the 19th century. Small wood and earth works fortified the first settlements in the American Colonies from the 16th century onward. Shortly before the start of the American Revolution in 1775, some of these early coastal fortifications were developed into more substantial structures. Among the strongest of these was the Spanish-held Castillo de San Marcos, which protected St. Augustine on the Atlantic coast of Florida. An earlier structure had protected the first Spanish settlement at St. Augustine, but in 1672 work began on an imposing stone-built fortification; the first substantial fort constructed on North American soil. Designed by the Spanish engineer Ignacio Daza, it was essentially a square structure 320 feet across, with a bastion on each of its four corners. Its curtain walls were 36 feet high, built using blocks of coral rock. A ravelin protected the fort's entrance (sallyport), and two drawbridges linked this feature to the main fort by spanning a moat. This imposing structure is important in that it introduced contemporary European concepts of fortification to the Americas.

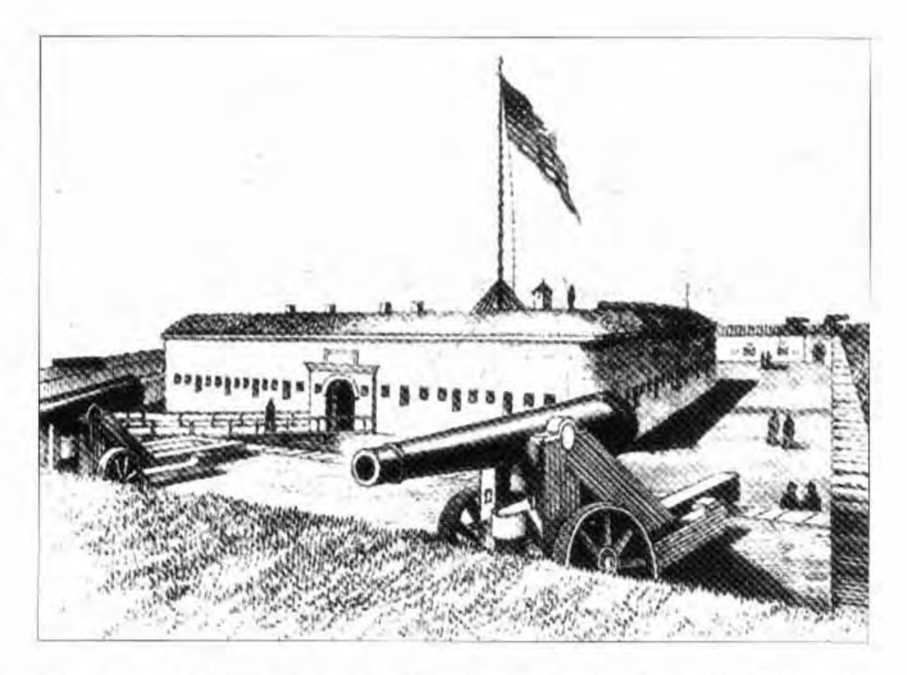
Work was started on a similar British fort designed to protect Boston Harbor during the 1690s. Called Castle William after the reigning monarch, it was built on a small island to the west of the inner harbor, and laid out using the same simple polygonal design as Castillo de San Marcos. In 1719, the French began work on a substantial fortified town on Isle Royale, which they named Louisbourg in honor of Louis XIV.

Elsewhere, fortifications tended to be smaller affairs, such as Sullivan's Fort (later renamed Fort Moultrie), which protected the entrance to Charleston, South Carolina. When the position was attacked during a British assault in 1776, it was discovered that the combination of sand and palmetto logs used to build the curtain of the fort proved virtually impervious to roundshot. Other temporary coastal fortifications were built during the Revolutionary War, most



Fort Zachary Taylor, built to protect the island harbor of Key West, Florida, was one of the most imposing of the Third System fortifications and one of the simplest in terms of its design. Work began on the structure in 1846, and it was built on a coral shoal just off the shore. (Stratford Archive)

The nature of coastal fortifications changed during the period covered by the Third System and the design of individual forts varied to suit the geographical limitations of the site. At Fort Totten, built in Queens, New York, during the Civil War, the engineers favored a low casemate structure surrounding a well-fortified citadel. (Clyde Hensley Collection)



notably Fort Mercer protecting Philadelphia, Forts Lee and Washington defending the Hudson River, and Paulus Hook, defending New York Harbor from the New Jersey shore.

Following the end of hostilities in 1783, little was done to improve the coastal defenses of the fledgling United States until the onset of the French Revolutionary War in Europe (1793–1802) increased the possibility that America could become embroiled in what was fast becoming a global conflict. President George Washington urged Congress to provide adequate defenses for the country's ports, and an investigative committee was established, charged with determining the best locations for coastal forts. The committee submitted its report to Congress in February 1794, and, three weeks later, expenditure on the first U.S.-built forts was authorized. This became known as the First System of coastal fortification, and building work encompassed by this Congressional initiative continued for ten years (1794–1804). To call it a Federal project is somewhat misleading, as individual states supervised and paid for many of the projects.

The foreign-trained engineer in charge of each construction project was given considerable latitude to modify the plans to accommodate local conditions, or take advantage of a local abundance of suitable building materials. Funds were limited, so work was done as cheaply as possible. Most of these coastal fortifications were extremely crude by contemporary European standards. Roughly-cut timbers, banks of stone and earthen banks were the most common features of these open-topped emplacements. In addition to a main battery facing to seaward, some of these forts included an earthen redoubt to guard against attack from the landward side.

Examples of forts built during this period include Fort Mifflin, built on Mud Island in the Delaware River to protect Philadelphia, Pennsylvania. Work began in 1798, and continued for five years. The fort consisted of a low polygonal curtain, with two bastions placed to protect the sally port, and a simpler star system of salients at the opposite end. A star fort on Governors Island, known as Fort Jay, protected New York Harbor, but it was later demolished to make way for a more imposing structure during the War of 1812. Perhaps the best-known coastal fort of this period is Fort McHenry, built to protect the port of Baltimore, Maryland. Work began on the fort on Whetstone Point in 1800, and continued past 1804 to incorporate advances introduced during the Second System. Its defenses were tested during the War of 1812, when it was subjected

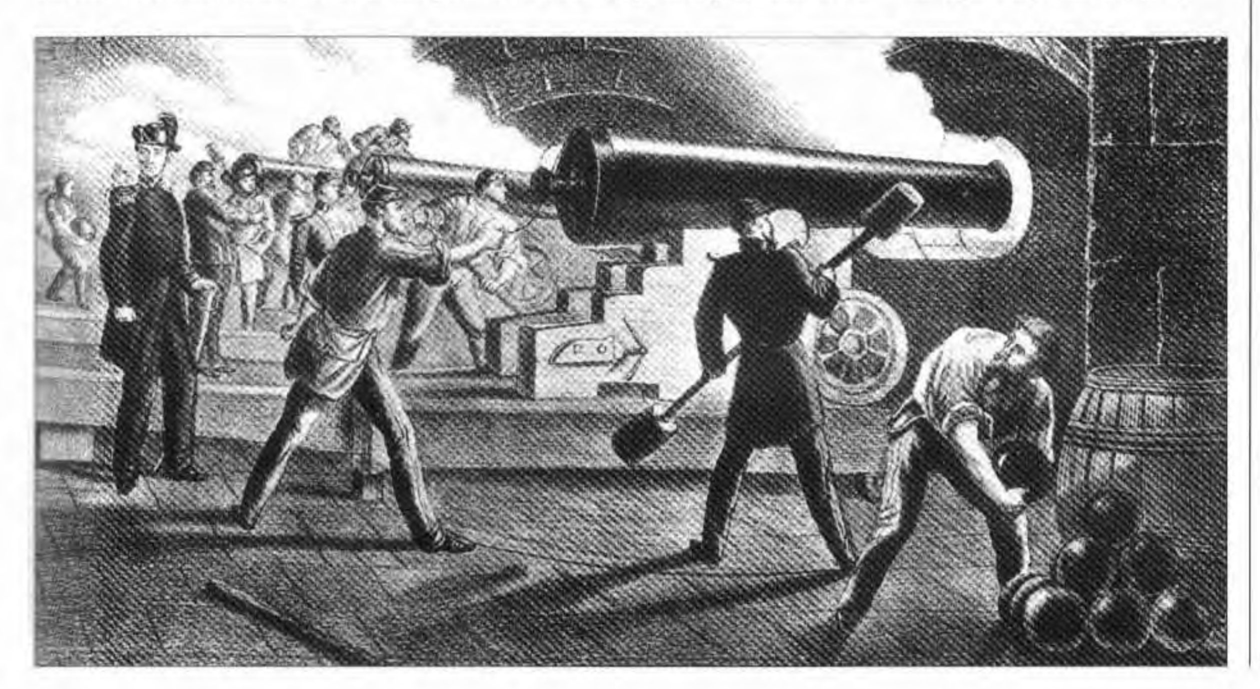
to a lengthy bombardment by artillery and rockets in September 1813. The event inspired the composition of the "Star Spangled Banner" by Francis Scott Keys. Like Fort Jay, it was a "star" fort, a term used rather loosely to encompass almost any form of fortification that formed the shape of a star. In fact, neither fort was a true star fort, although the American term continued in use well into the 19th century.

Although the United States became embroiled in a bizarre "Quasi War" with France (1799–1800) over the talks surrounding the Louisiana Purchase, it soon became apparent that the country was not immediately threatened by foreign invasion. Consequently, work on the fortifications slowed after 1800 and some of the completed works lapsed into disrepair. Funding for building work was reduced, while individual state administrations preferred to concentrate their funding on the upkeep of the few substantial forts that had already been built.

This period of decline in the readiness of America's coastal fortifications ended in June 1807, when the British frigate HMS *Leopard* fired on the USS *Chesapeake* during a dispute over the return of deserting British sailors. Building work on the First System of coastal forts had tailed off three years previously, but President Thomas Jefferson called for an immediate resumption of the building program. Another congressional committee examined the problem. In November 1807 it presented its report and, as a consequence, Congress authorized the expenditure of $1,000,000 on new building work. This time the forts were not going to be hastily constructed wood and earthen defenses. Major Joseph Swift of the U.S. Corps of Engineers developed a plan for a string of powerful fortifications, with brick-built citadels and casemated gun batteries. This became known as the Second System of coastal fortification, and work would continue for seven years from 1807 to 1814.

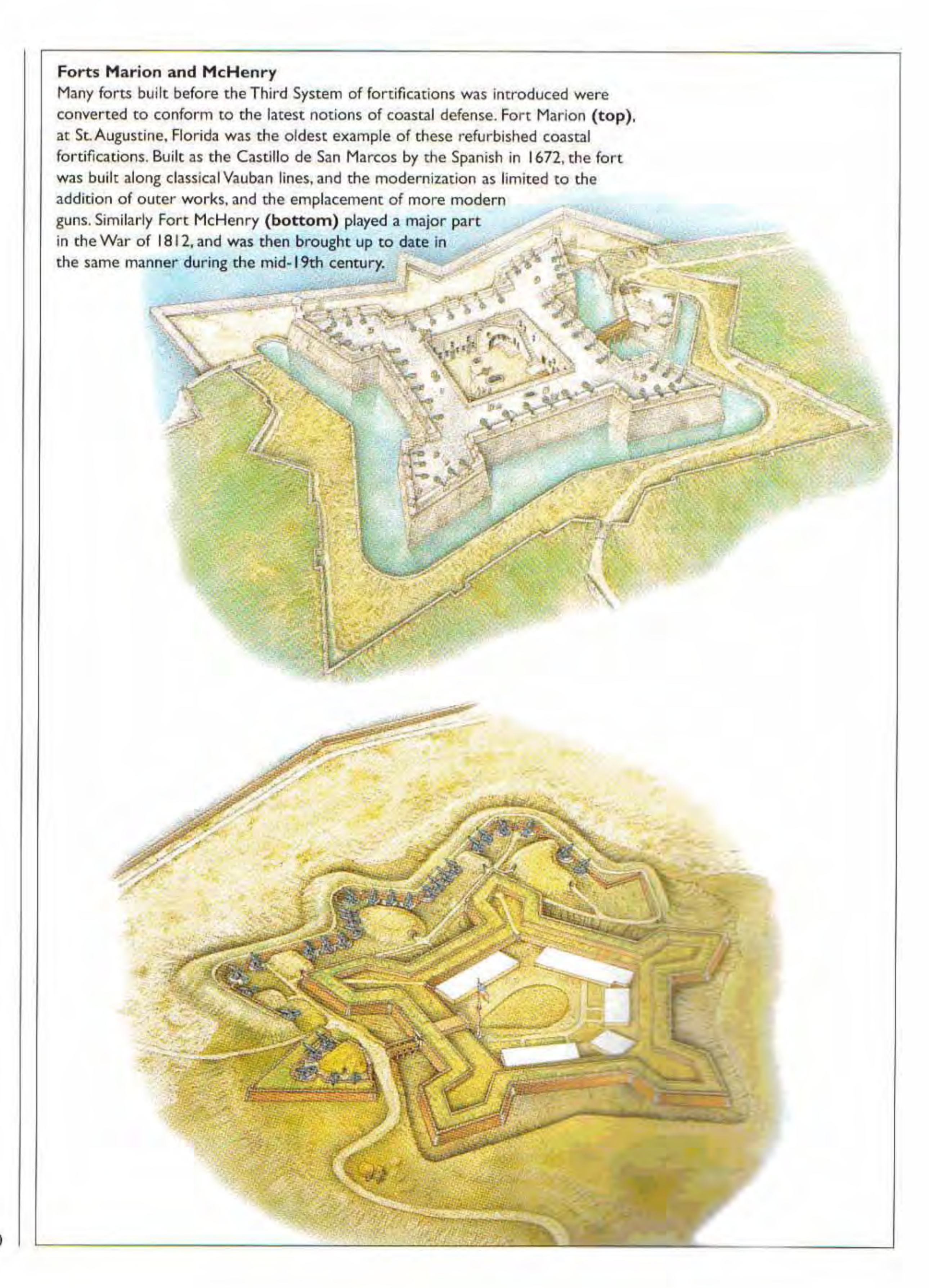
The first real difference between this system and the preceding one was that the defenses were planned and built by American engineers. As Secretary of State Henry Dearborn explained, it avoided "the unpleasant necessity of employing foreigners as engineers." As before, there was little control over what these engineers created, which led to a significant variation in the size, type and style of these forts. Second System fortifications fell into three broad types. The first were the small coastal batteries that were too unimportant to become real forts. These varied in shape and size, although many tended to be

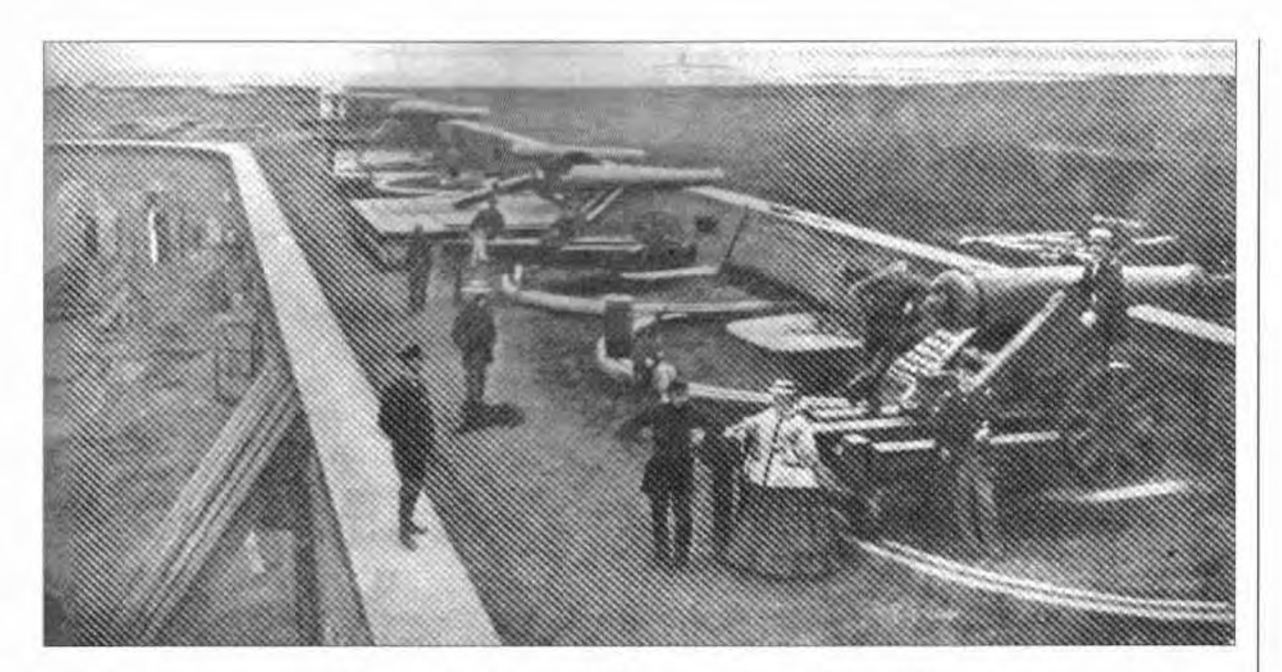
Union batteries in action during the bombardment of Fort Sumter, April 1861. The artist has taken liberties concerning the architecture of the fort and the design of the gun carriages, but otherwise, the overall portrayal of a casemate battery in action is reasonably accurate, and extremely atmospheric. (Stratford Archive)



Forts Marion and McHenry

Many forts built before the Third System of fortifications was introduced were converted to conform to the latest notions of coastal defense. Fort Marion **(top)**, at St. Augustine, Florida was the oldest example of these refurbished coastal fortifications. Built as the Castillo de San Marcos by the Spanish in 1672, the fort was built along classical Vauban lines, and the modernization as limited to the addition of outer works, and the emplacement of more modern guns. Similarly Fort McHenry **(bottom)** played a major part in the War of 1812, and was then brought up to date in the same manner during the mid-19th century.



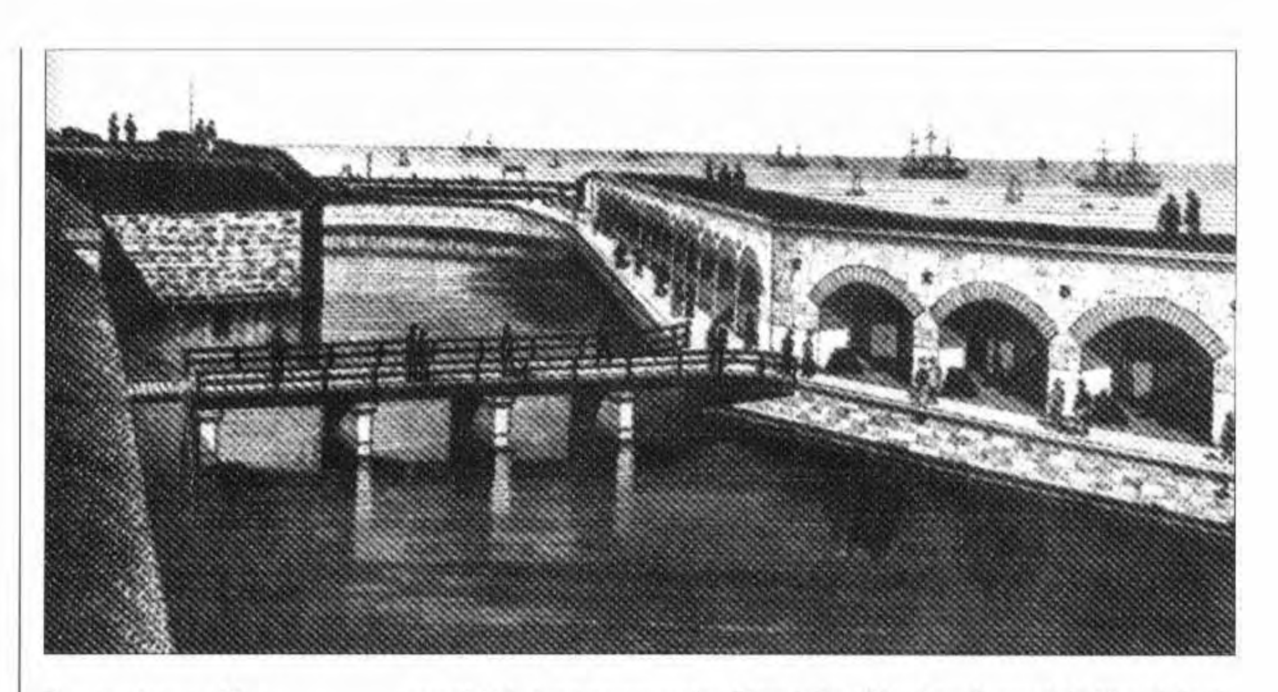


laid out in convex curves. All were open-topped, although some incorporated a small citadel or other defensive work on the landward side.

The next in scale were the composite forts based on earthen walls with a brick face to the curtain. By far the most popular type of coastal fortification built during this period, these defenses tended to be similar to the forts built during the First System. Many were circular or elliptical in shape, or combined a variety of curved batteries and more conventional square or rectangular citadels. Examples of these include Fort Norfolk, Virginia, Fort Richmond and Fort Tompkins defending New York Harbor and Ford Madison in Maryland. The most significant of the three general fortification types included in the Second System were the masonry forts, as these became the forerunners of the imposing brick- and stone-built Third System coastal fortifications that saw action during the American Civil War (1861–65). For the first time, American engineers introduced masonry-built casemates, although none of these early forts was built on the same scale as the later structures with their multi-tiered curtains. The real breakthrough of the casemate design was that it permitted the deployment of large guns housed low within a fort. Before this development, fort design required that pieces be sited on top of the structure, protected by an open-topped parapet (known as the *en barbette* method of gun emplacement). While this system had been employed in Europe, the introduction of brick-built casemates in North America represented a significant advance. For the first time, gunners were protected from mortar and small-arms fire, and the first tentative steps were made towards the production of tiered forts with an *en barbette* battery mounted on top of a casemate battery.

Most of these new Second System defenses were finished before the outbreak of the War of 1812. Although few saw active service, their presence certainly served to keep the superior British fleet at a respectful distance from the main American ports. The exception was Baltimore, which was attacked in September 1813. During the engagement, Fort McHenry managed to withstand a heavy bombardment. Shortly before the war, its First System walls had been improved by the addition of brick revetments, although its guns were still mounted in the *en barbette* manner. The success of the fort in withstanding the heavy bombardment served as a demonstration of the efficacy of the brick-fronted design, and encouraged the construction of more all-masonry forts. During the period from 1813 to 1816, several all brick structures were built or

A view of Fort Pulaski, Georgia, after its surrender. The fort was repaired and served as a headquarters for local Union forces, where these guns helped contain Confederate naval forces and blockade runners on the Savannah River. The group in the foreground is clustered around a 10-inch columbiad mounted on a wooden *en barbette* mount. (Stratford Archive)



The water battery of Fort Monroe, Hampton Roads, Virginia. The defenses of the fort were augmented by a series of single-tier casemates constructed on the "covered way." (Stratford Archive)

completed. A prime example of this is Fort Moultrie (formerly Sullivan's Fort), outside Charleston, which was rebuilt during the years following the attack on Baltimore. An even more spectacular Second System structure is Castle Williams in New York Harbor (not to be confused with the earlier fort of the same name in Boston Harbor). Built between 1807 and 1812, this was the first fort in the United States to be built around a series of casemate gun emplacements. The plan called for a circular brick-built fort of red sandstone some 210ft in diameter, with three tiers of casemates or barracks, surmounted by a terreplein. The lower two floors of casemates had 13 gun embrasures, while above these a floor of barrack rooms could be converted into an additional casemate if required. Above these floors, the terreplein was designed to carry 48 small guns, but, during the War of 1812, this was modified to permit the deployment of 26 powerful 32-pounder guns. This was the most imposing fortification on the Atlantic Seaboard of the United States, and the structure



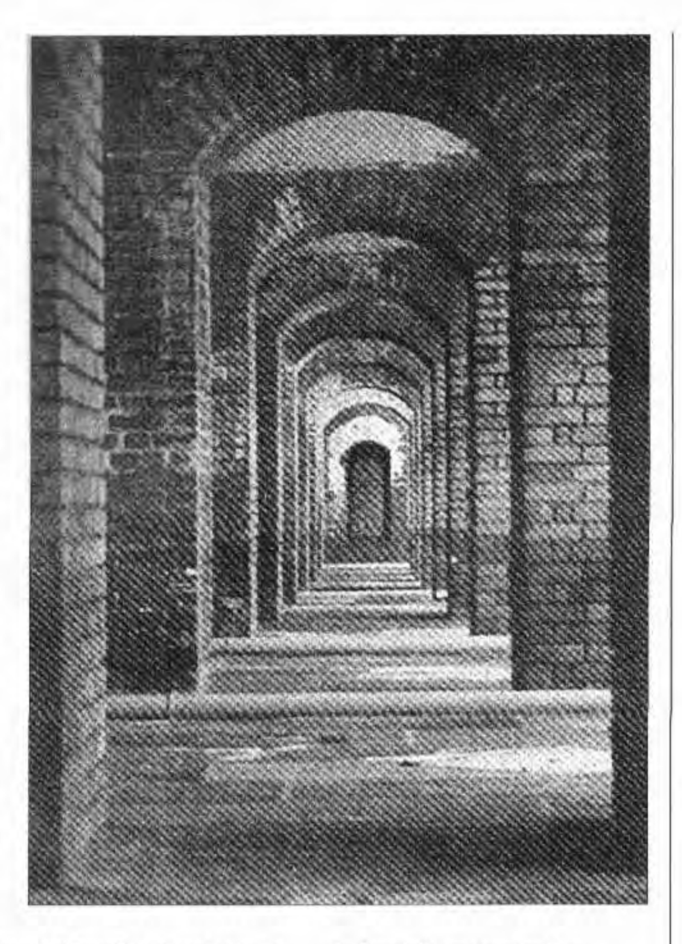
Smoothbore columbiad pieces mounted on iron casemate carriages in the water battery of Fort Monroe, Virginia, photographed shortly after the Civil War. Note the unusual color scheme of the fort, where the lower casemate walls have been painted white. (Estate of Wright Langley)

was deemed to be a successful one. It therefore served as the prototype for the even larger brick-built fortifications of the Third System.

By the time the War of 1812 ended in 1815, almost every large port in the United States was protected by a Second System fortification of some kind, while the major coastal cities were defended by several defensive positions. Additional batteries augmented many of them. For example, Fort McHenry was strengthened after 1813 by the addition of powerful water batteries (open-topped batteries lying close to the water's edge).

The first two fortification systems had been developed as a result of the threat of war, or during periods of uncertainty when war was raging in Europe and the Caribbean. This meant that many First System fortifications were quick and easy solutions built to fill an immediate need. Second System fortifications were more involved, with the majority designed to be permanent. Some of these, including Castle Williams, were extremely imposing defensive structures, and would become integrated into later systems. During both phases, the majority of fortifications were constructed within four years of the beginning of the program, and all were completed within a decade. In both cases, the impetus for construction ended when the threat of war, or the end of a war, meant that their completion was no longer imperative.

By contrast, the system that followed was a peacetime undertaking, and construction work spanned several decades. The hastily built fortifications of the first two systems were insignificant compared to the enormous structures built over the next few decades.



At Fort Jefferson on the Dry Tortugas, off Florida, the rear of the casemates were linked by an arched gallery leading to the corner bastions of the fort. The sheer physical challenge of transporting millions of bricks to an uninhabited rock in the Gulf of Mexico, then building this complex structure 35 miles from the nearest habitation must have been immense. (Author's Collection)

The Third System of coastal fortification

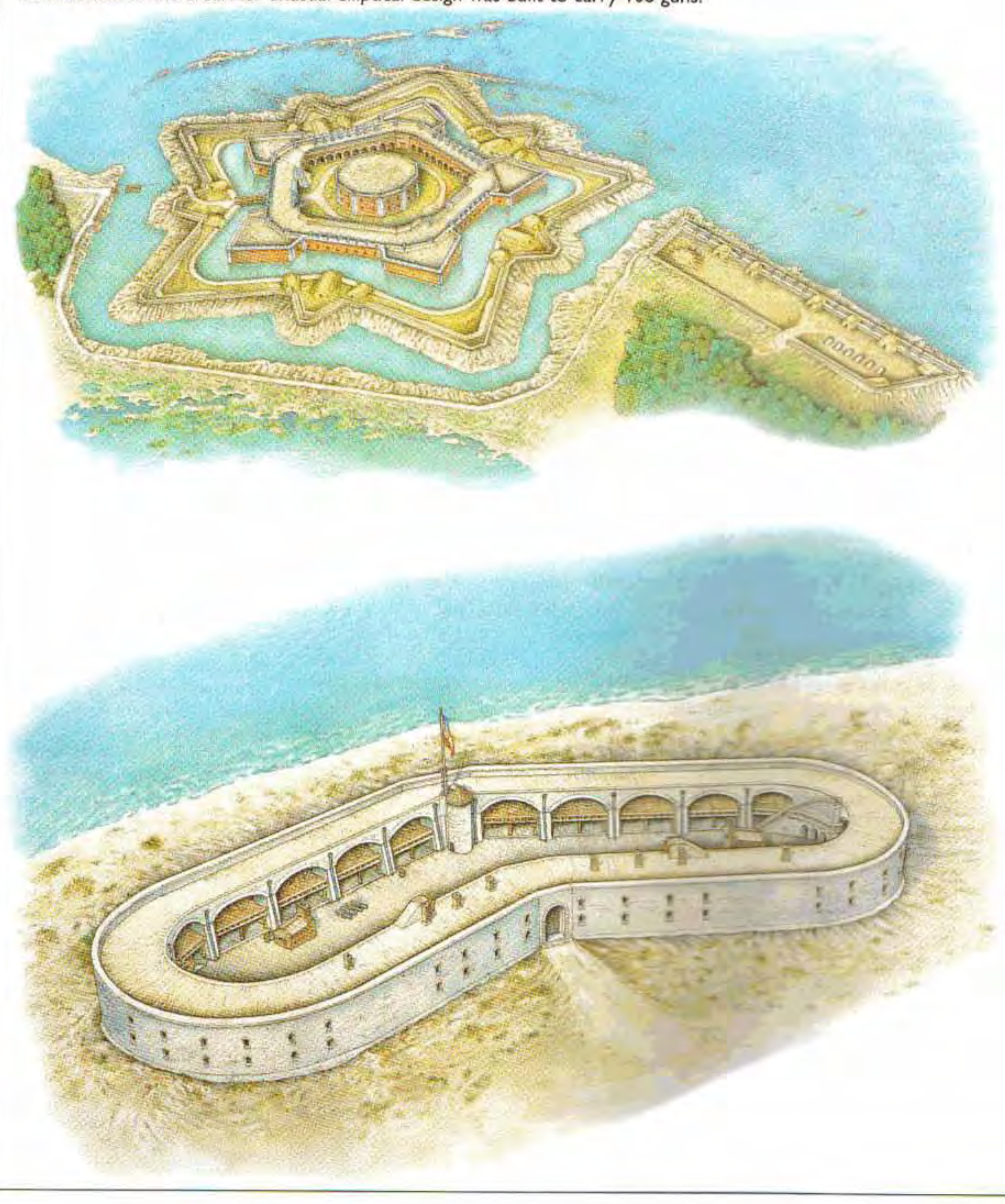
The era of construction following the War of 1812 was instigated as a direct result of British depredations during that conflict. It had been demonstrated that without adequate coastal fortifications, an enemy who enjoyed control of the sea could land more or less where he liked, and raid far inland. The maritime frontier needed better protection, and the Third System, which developed on the heels of the war, was the first coastal fortification initiative created as a result of an analysis of defense priorities rather than as a knee-jerk reaction to the threat of war.

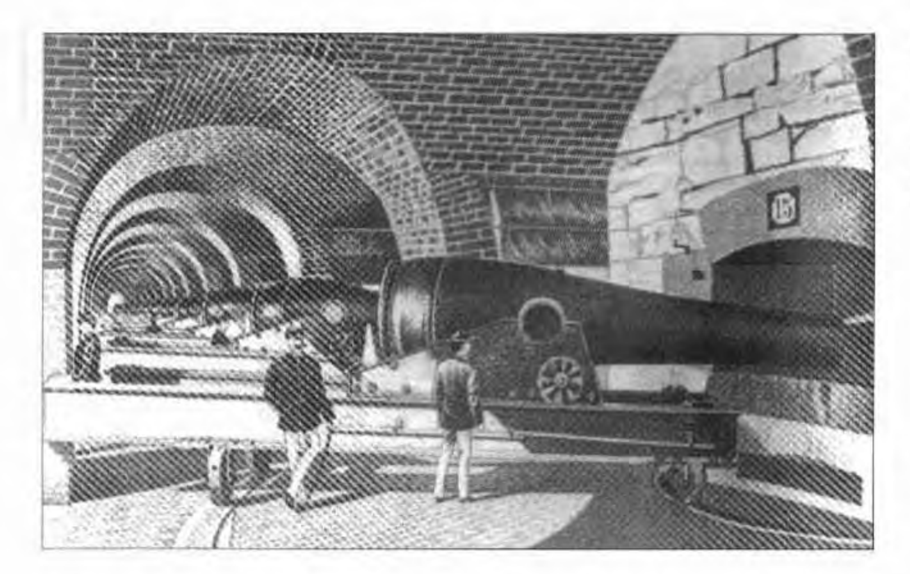
As the work on the Third System was started in 1817, immediacy was no longer an overriding consideration and attention could be directed at last to the creation of a permanent and truly integrated system of harbor defenses.

During the previous two periods of fortification, plans were prepared by individual engineers based on general guidelines issued by the Secretary of War. What this lacked was some sort of planning body, able to set standards and ensure that the latest developments in fortification design were incorporated in any new structures. This was rectified in 1816, when a board of engineers was formed chaired by the French military engineer Brigadier-General Simon Bernard, who until four years before had served as a brigadier of engineers in the French Napoleonic army. Four military and naval engineers, including the immensely talented Lieutenant-Colonel Joseph G. Totten, assisted him (his other colleagues were Brigadier-General Joseph G. Swift, the Army Chief of

Forts Jackson and McRee

On the shores of the Gulf of Mexico, coastal fortifications had to be built where they were most needed rather than on sites which were ideally suited to the purpose. Fort Jackson **(top)** was built in a swamp on the banks of the Mississippi River, where her casemate batteries combined with those in Fort St. Philip across the river to cover the river approaches to New Orleans. The firepower of the main fort was augmented by the small Water Battery to the south-east, shown on the right of this view. Fort McRee **(bottom)**, built to protect Pensacola, Florida was built on sand, one of four brick-built fortifications in the area. Her unusual elliptical design was built to carry 108 guns.



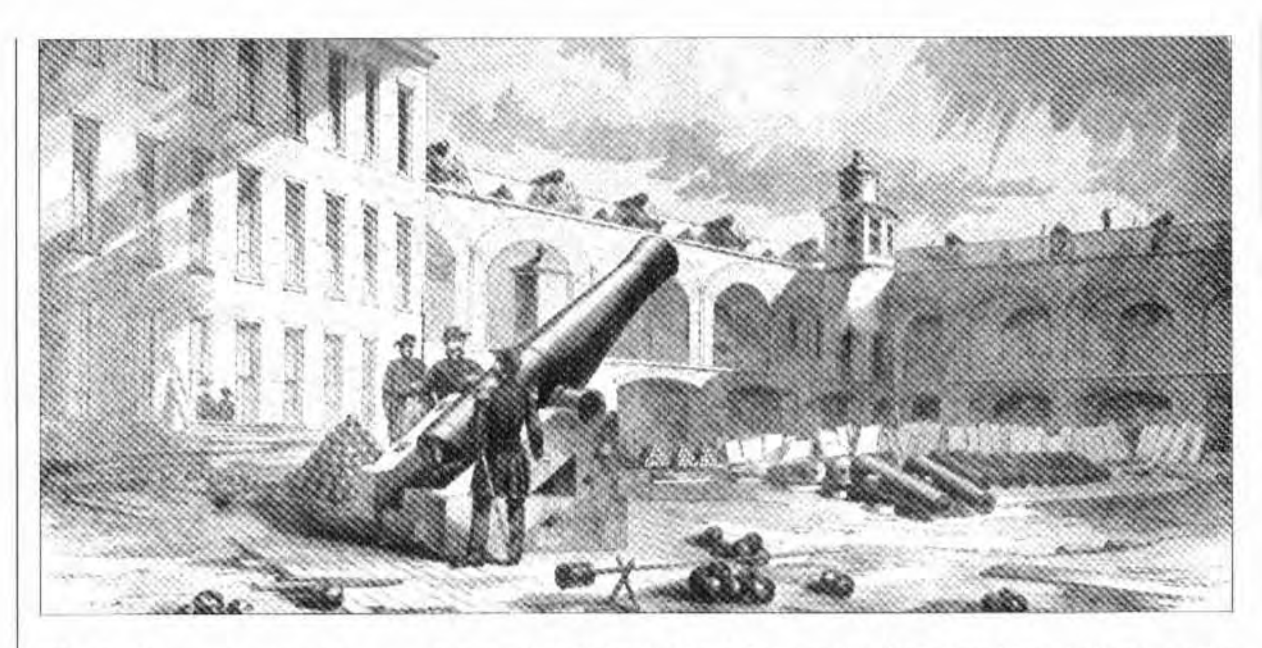


A 10-inch Rodman mounted on an all-metal casemate carriage. This engraving, probably produced shortly after the war, is almost certainly meant to represent the water battery of Fort Monroe, Virginia. (Stratford Archive)

Engineers, Lieutenant-Colonel William McRee and Elliot, Swift and Elliot later resigned in protest at the government hiring Bernard, a foreign national). This Bernard Board of four experts was charged with producing a fortification plan for the entire U.S. coastline, the selection of suitable sites, and the development of plans for the structures. For the first time, a competent professional body was able to supervise all aspects of coastal fortifications, and in various forms this group would continue to perform these functions until after World War II. Members of the board spent two years touring the entire Atlantic seaboard, as well as the newly acquired coastal regions sites in the Gulf of Mexico, and they presented their findings to the Secretary of War in February 1821.

Their first point was that the U.S. Navy, not the Army, should be the first line of defense in coastal waters. They listed the important naval bases, shipyards and harbors, and proposed means of protecting these strategically important locations through the construction of new fortifications. In addition, they recommended the fortification of several coastal cities, river mouths and entrances to inland waterways, which, taken together, would create a powerful defensive barrier protecting the most vital areas of the coast. The Board also discussed road and water communications along the American coastline, and the employment of the Army and Navy in the event of a coastal attack.[1] Of the 40 sites they listed, 17 were deemed of the utmost importance to national security and the Bernard Board urged that defensive measures should be taken immediately in order to safeguard their security. The remaining sites were grouped into two bands of lesser importance. The Secretary of War accepted these recommendations, and approved the Bernard Board's list of the most important sites for new fortification works. The immediate work of surveying and reporting completed, Bernard and his colleagues turned their attention to the development of the various fortifications in their key locations. It was only when this work was under way that they were able to revisit their initial list and create a long-term strategy for the fortification of the remaining 23 sites. Inevitably, construction work ate into the available budget, and, while the major ports and river mouths were fortified, other less important areas remained unprotected, save for the crumbling remains of obsolete First and Second System fortifications. Priority was also given to the newly-acquired territories in Florida, where there were very few defenses, and the Gulf Coast, Louisiana.

1 Although the contemporary term "harbor fortification" was frequently used to refer to these sites, modern historians more readily use the terms "seacoast" or "coastal." The author has followed the modern convention by using the term "coastal" throughout this work.



When Fort Sumter was captured by the Confederates in April 1861, the new garrison found that one of the unmounted 10-inch columbiad smoothbores on the parade had been sited on an improvised carriage for use as a makeshift mortar. (Stratford Archive)

It is significant that in the 1821 report by the Bernard Board, little mention was made of existing First and Second System fortifications. Bernard saw these as a stopgap, providing a modicum of protection while larger and better-planned Third System fortifications were constructed. This was altered when financial constraints were taken into account, and several of these earlier fortifications were incorporated into the new construction program, effectively turning the earlier works into full Third System fortifications. Examples where this was done include the defenses built to protect Portland, Maine, Boston, Massachusetts, Annapolis, Maryland and Charleston, South Carolina, to name but a few. In all, 18 Second System fortifications were updated in this manner. In addition, a handful of older foreign forts acquired during the incorporation of Florida and the Louisiana Purchase were also earmarked for replacement or renovation.

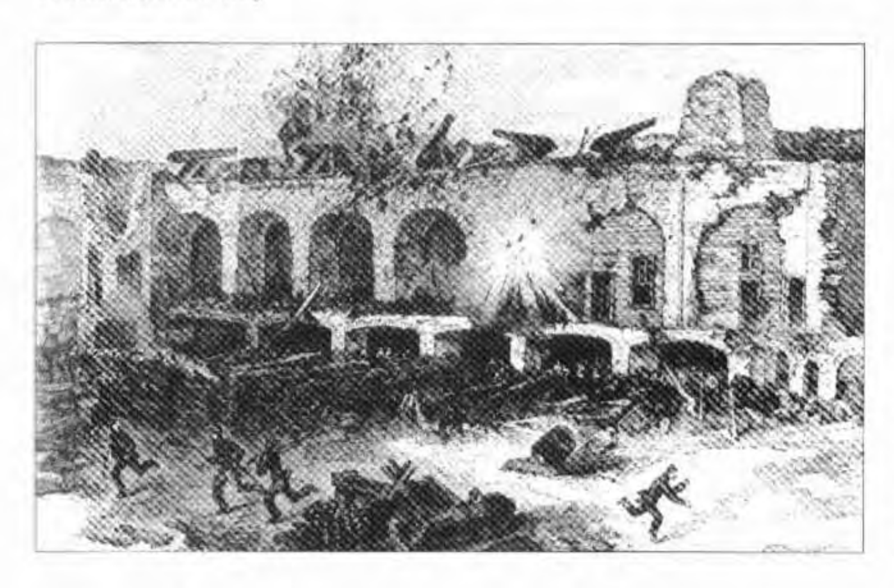
Defensive works of the Third System fell into several distinctive groups, from small stand-alone coastal gun batteries to vast fort complexes. Of these, the coastal gun batteries were obviously the easiest and fastest to construct, as well as the least expensive. These works were usually built in areas that were deemed of secondary importance to national security, where the expense of a larger fortification was deemed inappropriate. Others were constructed as a stopgap measure and incorporated into a defensive scheme when a larger fort was built alongside them. Unlike earlier coastal batteries these works tended to be linear, with a single row of up to 20 large guns protected by a stone parapet with a sloping earthen glacis in front of it. Better protected coastal batteries were constructed around a long brick-built casemate. This was covered by a stone roof that protected the works from mortar fire.

A variant of the small coastal battery was the Martello tower, named after the original circular fortification built near Martello in Corsica. A staple of coastal fortification in Europe during the Napoleonic Wars, these structures resembled tall (or sometimes squat) round castle keeps, surmounted by a gun platform capable of carrying heavy ordnance. The smallest works of this kind housed a single heavy gun, but by the time the system was introduced in America the structures had become more complex. The design and style of these secondary fortifications varied widely. The Martello tower built on Tybee Island, Georgia, was squat and circular, with a small upper gun platform capable of taking a single gun. The largest Martello towers were found in Key West where both the East and West Martello towers were built around a central

square tower, topped with a platform for four guns. In both cases the tower was protected by what amounted to a significant fort, formed from an angled casemate battery of 12–14 gun positions and rear defensive works, which enclosed the perimeter of the Martello tower itself. These two forts were constructed soon after the start of the Civil War by the Union garrison of Key West, and therefore represent the culmination of a minor but significant sub-group of American coastal fortifications. Although Martello towers were relatively uncommon, for some reason the majority of these structures were built in the South (five of the six were located in Florida, Louisiana and South Carolina, the remaining Martello tower was in New Hampshire).

While these smaller coastal fortifications were impressive, the major part of the Third System program involved the construction of large masonry-built fortifications. The large forts of this type built around the coastline of the Southern States would later play a significant part in the Civil War. Wherever they were located, these substantial fortifications all shared certain characteristics. They were solid, substantial structures, capable of housing an impressive number of artillery pieces protected in well-fortified casemates. These guns were usually emplaced in tiered casemates, surmounted by a terreplein, with a large central parade. They were expensive structures, requiring a significant outlay to build them and a continuing expenditure to maintain them, garrison them and keep them in readiness for war. A constant shortage of both funding and manpower would limit the effectiveness of these great structures from the time they were built until the Civil War, when fiscal constraints were removed. To some extent the lack of resources was anticipated by the Bernard Board, who tried to make their structures as durable as possible and took into account potential problems of coastal erosion, salt-water damage and ease of maintenance during their planning and construction.

The choice of masonry as a building material is another important feature of these fortifications. The choice of masonry fortifications was almost certainly made after the successful completion of trials conducted at Castle Williams. Solid shot fired at close range only chipped the surface of the nine-foot-thick curved curtain of the fort, penetrating less than two inches. Masonry was therefore deemed virtually impervious to solid shot. Similar tests conducted in Europe supported the belief that masonry-built fortifications were proof against all but the heaviest and most sustained bombardments. An added advantage was that it was relatively resistant to the eroding effects of salt water. For the Bernard Board, this was all the evidence they needed. Third System coastal fortifications would be built from masonry.

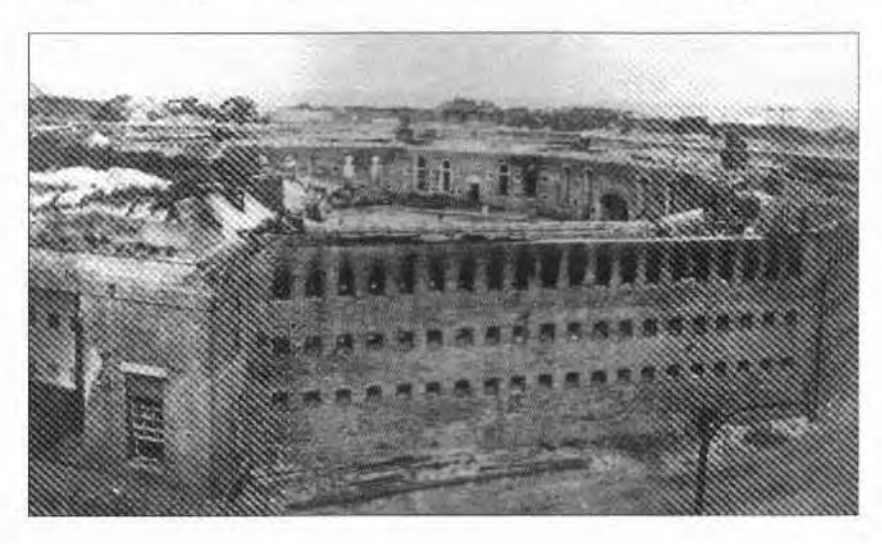


The interior of Fort Sumter, South Carolina, during a mortar attack at the start of December 1863. By this stage most of the upper works of the fort had been destroyed, and the Confederate garrison used the rubble to enhance the protection of the fort's lower casemate tiers. (Stratford Archive)

Masonry was a versatile material. It permitted the construction of scientifically-designed casemates, with each gun and embrasure housed in its own arched bay. These same arches permitted the building of tiered casemates, an essential feature of the imposing fortifications that appeared during this era. The designer of Castle Williams first conceived the concept of building forts with multiple tiers of casemates in 1807, and the technique was used on a handful of other forts before it became the standard style. The advantage of this design meant that it permitted the deployment of the maximum number of artillery pieces, ensuring that it would be suicidal for any wooden ship to attempt to bombard the fort, or the port it defended. In theory, this was an extreme case of deterrence, where the scale of the battery as much as the physical protection afforded by the brick structure itself made the fort impregnable. These structures were designed to hold their own against entire fleets. Although this never happened in a way that could have been anticipated by the designers, these forts managed to perform well against warships during the Civil War, despite revolutionary changes in warship protection, ordnance and ammunition.

One consideration that the designers had to incorporate in their plans was the possibility that the nature of the fort's armament would change at some future date. It was expected that guns would become bigger and heavier, and, while space needed to be made for these potential changes, the size of the embrasure the guns fired from needed to be kept as small as possible, to minimize the risk of a penetrating hit by an attacker. Joseph G. Totten, who became the Board's expert in casemate design, addressed this problem by designing small embrasures with apertures of less than four feet across. Eventually, he also designed heavy iron shutters, which were designed to minimize the risk of a penetrating hit while a gun was being reloaded. His casemate design also permitted the guns inside them to train to either side, permitting them to engage targets at angles of 30° on either side of their central firing position. Clearly, the greater the distance the guns could train round inside their embrasures and casemates, the greater the number of guns that could engage an enemy at any one time.

Bernard himself heavily influenced the fortification designs the Bernard Board produced. As a French engineer, he had studied the geometric fortification systems designed by the great French military engineer Sebastien Le Prestre, Seigneur de Vauban (1633–1707). These grandiose fortifications had become the basis for later 18th-century and early 19th-century European defensive works, and Simon Bernard drew upon his experience in Vaubanesque design. However, he tempered the scale of the fortifications he designed to suit



Fort Morgan, Mobile Bay, Alabama, photographed from the nearby lighthouse after her surrender to Union forces in August 1864. The damage inflicted on the fort by the Union fleet was concentrated on the upper works, and the southwestern seaward scarp. (Salamander Archives)



By 1864, Fort Sumter looked less like a fort than a gigantic mound of rubble. The garrison conducted repairs of the fort at night to reduce the risk of being caught in the open by a sudden mortar attack. Traces of the lower tier of casemates can just be seen in the distance. (Stratford Archive)

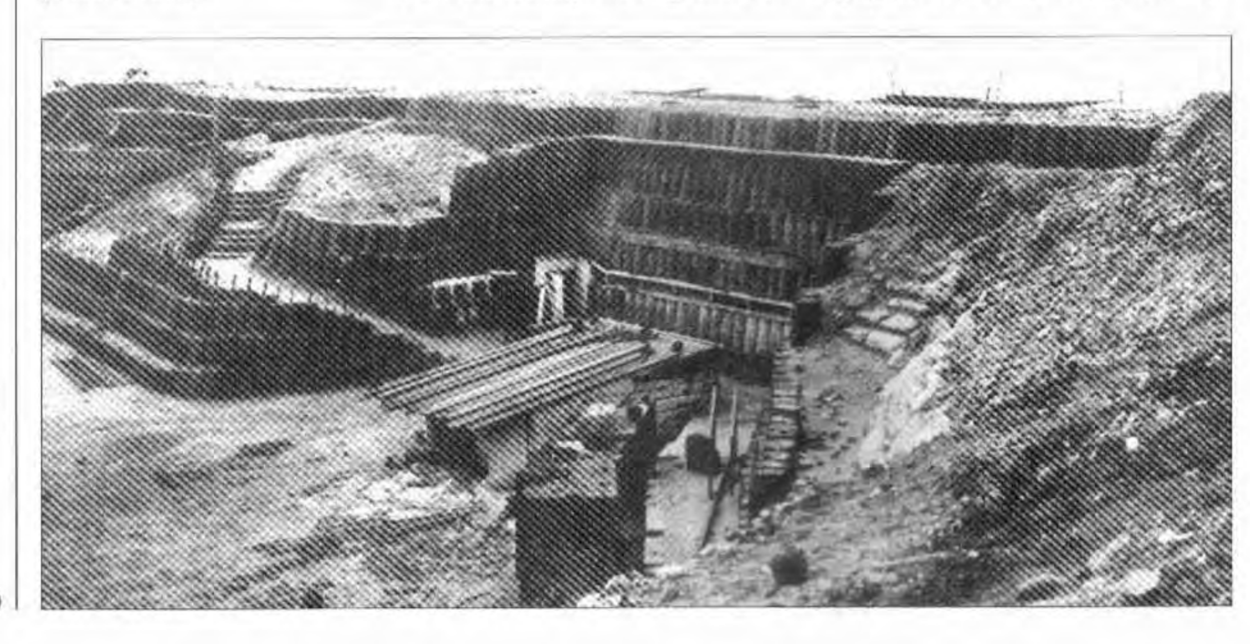
the requirements of America's budget and coastal geography. Joseph Totten became an early convert to this style of formal fortification, with its protective bastions and moats, ravelins and terrepleins, counterscarps and covered ways. It was the genius of the New England-born engineer that he was able to amalgamate the new casemate design that he advocated with the imposing geometric defensive systems envisaged by Bernard. When Bernard returned to France in 1832 Totten replaced him as head of the Board, and the French influence continued as the American engineer worked on plans for other polygonal fortifications with scientifically worked out angles of fire.

This said, the first forts produced by the Board were far from symmetrical, but conformed to the particular requirements of the land on which they were built. Fort Monroe protecting Hampton Roads in Virginia was a large hexagonal structure of irregular shape, with a redan to one side and a casemated water battery augmenting its defenses. Work began in 1822 and a garrison protected the site from 1823 until its completion ten years later. Designed to contain over 300 guns, the number was increased to 442 by additional water batteries. Fort Adams, protecting Newport, Rhode Island, was a similar structure built between 1825 and 1838, supervised for the most part by Totten himself.

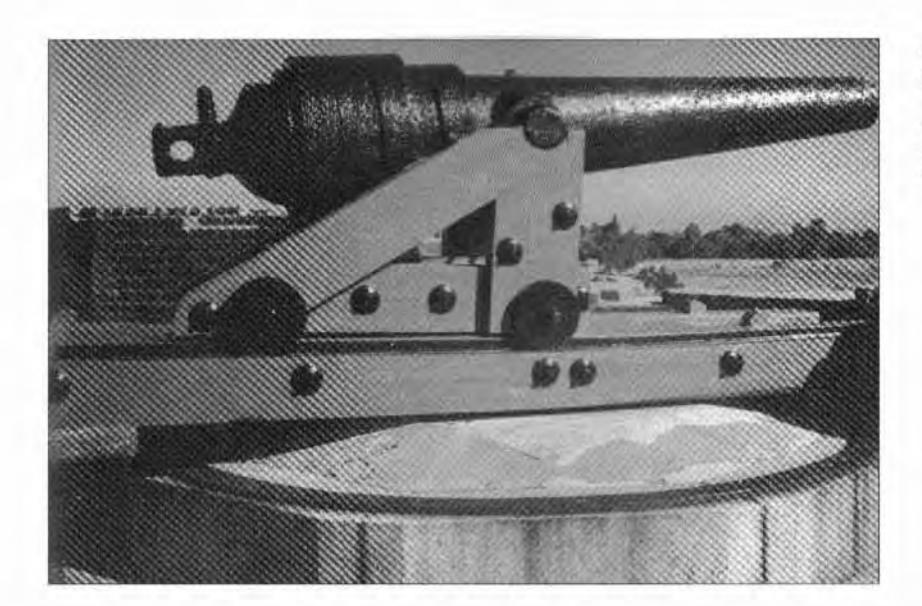
After these first projects were started, a certain similarity of design began to appear. The fortifications designed by Bernard and Totten after 1825 were symmetrical, with multiple tiers of casemates. This system of placing one layer of casemates on top of another led to an increase in the height of fortifications after the design of Fort Monroe and Fort Adams. The first forts designed by the Bernard Board contained bastions in the Vauban style, but this changed through Totten's influence. For him, the artillery armament of the fort was sufficient to deter any close assault, and traditional systems of fortification (as typified by Castillo de San Marcos) were deemed to be largely unnecessary. The result was a general shrinking of bastions, and the replacement of flanking batteries of small guns designed to fire up the length of the moat with fewer, larger pieces. This trend was illustrated by the design of Fort Schuyler, built between 1833 and 1841 to guard the approaches to New York Harbor. The fort was designed with reduced bastions, a symmetrical form, and a two-tiered casemate structure. Generally, the design of large Third System coastal fortifications designed between 1825 and 1832 emphasized the use of bastions, each anchoring one of the five corners of a hexagonal curtain. The hexagon shape was the result of simple mathematics. The guns inside a casemate could traverse a maximum of 60° (30° to each side of a central point). This meant that if the sides of the fort were angled at 72°, the risk of an enemy being able to find a dead zone at the corner of the fort was reduced, as the vulnerable area of frontage was limited to 12°. The more maneuverable guns mounted on the

terreplein were designed to further protect this dead zone. This said, forts were rarely constructed as true hexagons. Instead, the landward, or least threatened, side of the fortification was flattened by reducing the length of the two angles sloping back towards it. In other words, forts had a distinctive front, side and back. This was seen in the design of Fort Sumter protecting Charleston, South Carolina, and Fort Pulaski, built to protect Savannah, Georgia. Work on both of these fortifications began in 1829, towards the end of Bernard's tenure as head of the Board. Their design also reflects the growing influence of Totten, as both forts lacked projecting bastions, though Fort Pulaski's design included two truncated bastions anchoring each end of its landward curtain. Totten's argument for the lack of bastions was that both forts were deemed to be relatively safe from direct assault due to their geographical location (Fort Sumter was surrounded by water, and Fort Pulaski was built on a marshy island). To safeguard against the remote possibility of an assault, Fort Pulaski was further protected by a series of redans and outer works constructed to protect her landward side. Compared to earlier structures, these forts were also more compact, requiring smaller garrisons and making their perimeters easier to defend. Another feature that was instantly noticeable to anyone looking at Fort Sumter was the close proximity of the lower tier of casemate embrasures to the sea. By keeping the guns as low as possible, the likelihood that small boats could sail under the angle of fire of the guns was reduced. This also increased the likelihood of ricocheting fire, where the roundshot skipped across the water like a skimming stone. Given the right conditions this increased the range and effectiveness of the guns. This was another design innovation devised by Totten.

While few large projects were undertaken after Bernard's retirement in 1832, gaps in the coastal defense system led to the building of fortifications in isolated places, the most extreme example being Fort Jefferson, built on the Dry Tortugas 68 miles west of Key West. These designs tested the ability of Joseph Totten, and his success in overcoming the structural and logistical problems incurred in their construction marks him as one of the greatest military engineers of his age. Totten became the real mastermind behind the design of these later forts, and his emphasis on the effectiveness of massed ordnance as a means of protection was taken to new levels with these later forts. His trademark remained the creation of large gun batteries mounted in multiple-tiered brick-built casemates, but in a few cases this density was impossible due to physical constraints. At Fort Jackson,



The interior of Fort Sumter after her abandonment in February 1865. When Union troops occupied the fort, they were amazed that it was still a defensible position. The Confederate garrison extensively repaired this casemate. (Stratford Archive)

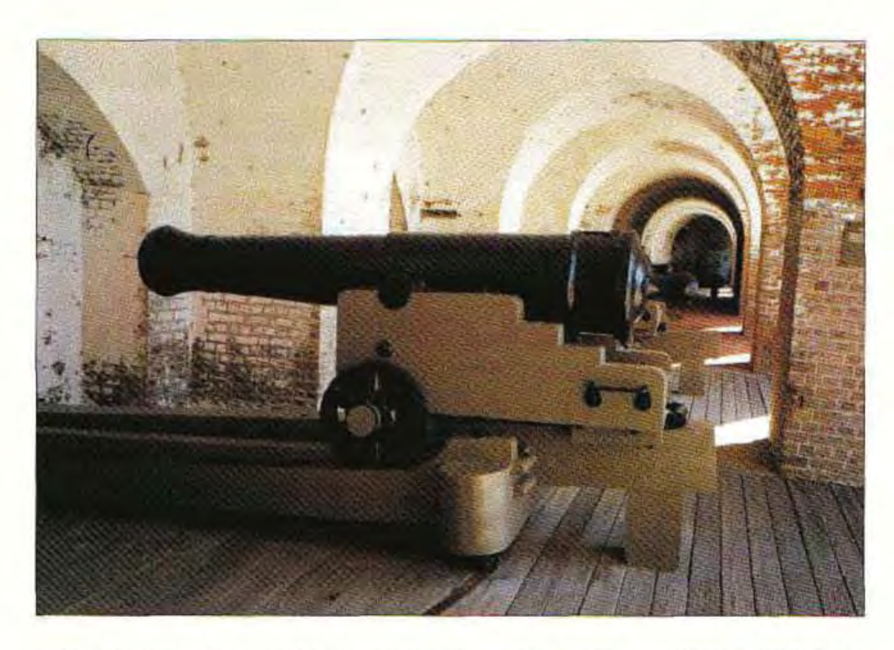


A Parrott rifle sited on the terreplein of Fort Pulaski, Georgia. This rifled weapon is mounted on top of a granite plinth, capable of an all-round traverse. (Author's Collection)

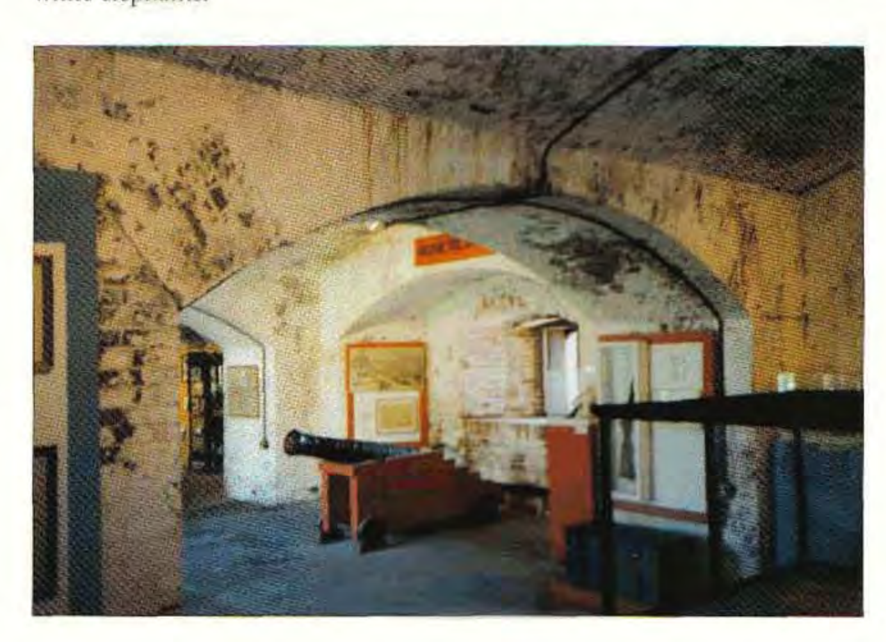
protecting the Mississippi River approaches to New Orleans, the swampy ground prevented the creation of a three-tiered casemate structure, as the weight would have led to the fort sinking into the ooze on which it was built. A similar problem faced the engineers who built Fort Pulaski on Cockspur Island, as the muddy ground prevented the construction of a larger, heavier fort. In other places, Totten was free to build his forts the way he liked. Fort Zachary Taylor, protecting Key West, Florida, was built on coral bedrock, permitting Totten to build a three-tired casemate fort. Fort Point guarding San Francisco and Fort Richmond, on New York's Staten Island, were both immense three-tiered structures. Shortly after the end of the Mexican–American War (1846–48), the Bernard Board drafted plans to increase the number of fortified sites around the coast, including minor harbors and coastal inlets into the defensive scheme. This ambitious program involved 182 separate projects, providing protection for virtually every U.S. harbor from the Canadian border of Maine to Texas, the length of the Mississippi River, and 19 locations along the Pacific Coast. Lack of funding prevented the commissioning of any of these works before the start of the Civil War in 1861.

The large coastal fortifications of the Third System were also never fully completed, as lack of funding, manpower or ordnance hindered their progress. For instance, many forts begun during the 1840s still lacked sufficient guns and garrison troops to make them fully effective some 10–15 years later when the United States was torn apart by Civil War. These forts, designed to protect the coastline of the United States against attack by a foreign power, were only tested in anger against fellow Americans. Fortifications built in the Southern states of North and South Carolina, Georgia, Florida, Alabama and Louisiana all played significant parts in the war for control of the Confederate coastline and, for brief periods, they became the focal point of the struggle. When the conflict began in April 1861, many of these fortifications were unready for war and were found to be unsuited to the internecine conflict that raged around them. Totten and his fellow engineers had designed their fortifications to face seaward attacks and many were ill prepared to meet an assault by local secessionist militiamen. To make matters worse, during the months leading up to the first shot being fired the government was reluctant to reinforce their forts in the Southern states, for fear that this could inflame the local population. These partially armed and undermanned fortifications were therefore vulnerable to sudden assault and all but four of these strategically vital works fell into Confederate hands when the war began.

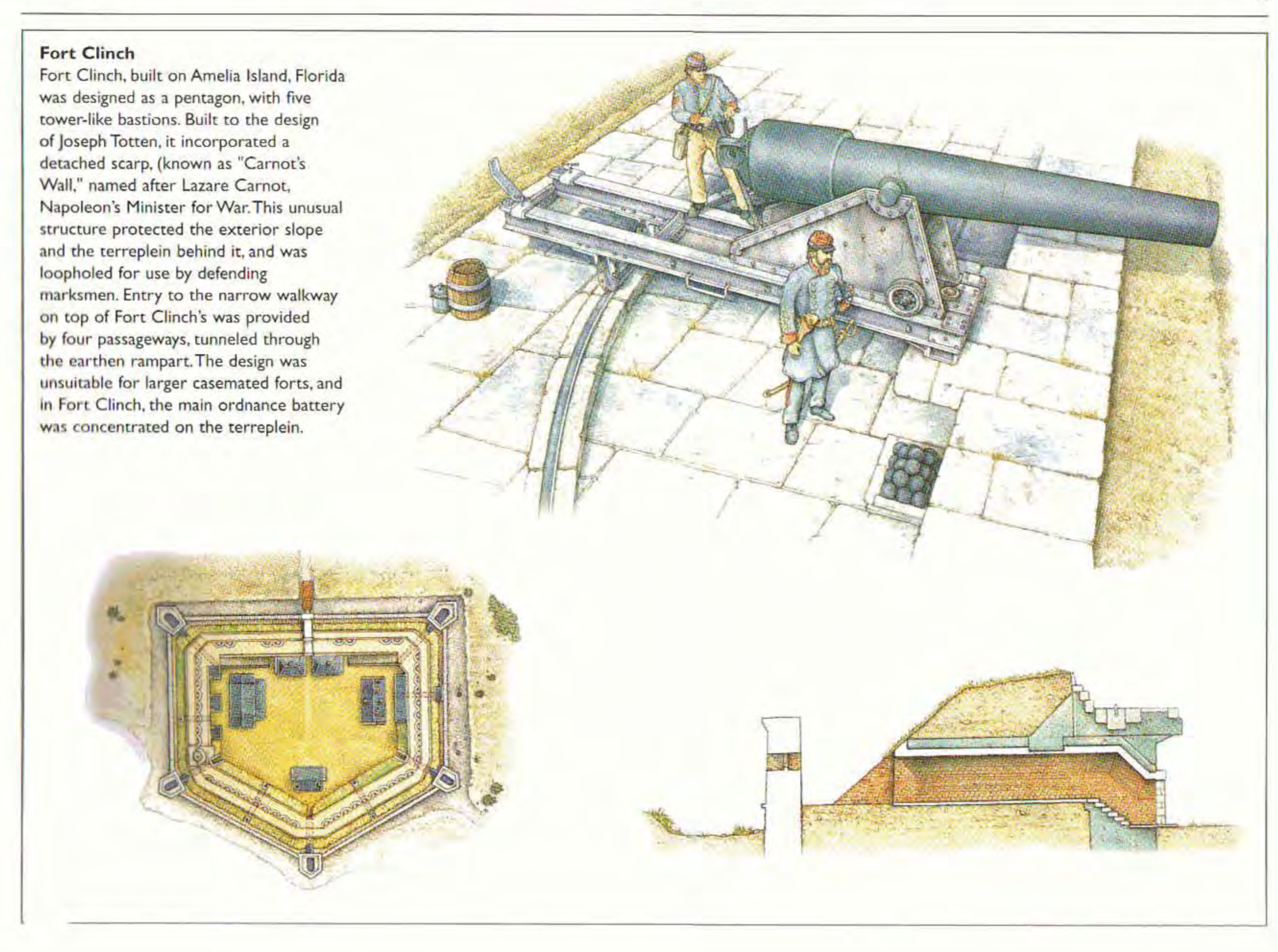
A smoothbore columbiad on a reconstructed wooden casemate carriage. The upper slide carriage is run back as far as the rear chocks of the lower carriage. This was the reloading position of the piece. Note the traversing rails, countersunk into the wooden floor of the casemate. (Author's Photograph)



While Totten was unable to predict the nature of the conflict that blighted the United States in the 1860s, he and his fellow Board members were well aware of technological changes in the design of ordnance. While he still placed his faith in the strength of his masonry-built forts, he was aware that they had proved themselves against solid roundshot fired by smoothbore guns. The coming war would see these structures attacked by far more potent weapons: high velocity rifled guns, firing either solid shot or explosive shell. Both sides placed considerable importance in these forts, and in the contest for control of Confederate ports. Their flaw was that they were designed to oppose fleets of slow-moving wooden warships armed with relatively light and inaccurate ordnance. Within a few years they would face siege artillery, ironclad warships and rifled guns. These impressive coastal fortifications proved to be extremely vulnerable to these new guns, and, despite the best efforts of engineers to overcome their limitations, they proved to be little more than obsolete white elephants.



The interior of the casemate battery of the West Martello Tower, Key West, Florida. Although in a bad state of repair, the sound construction of this late-war brick-built casemate is evident. The building now houses a small museum: part of the Key West Art and Historical Society exhibit. (Author's Photograph)



Fort Clinch

Fort Clinch, built on Amelia Island, Florida was designed as a pentagon, with five tower-like bastions. Built to the design of Joseph Totten, it incorporated a detached scarp, (known as "Carnot's Wall," named after Lazare Carnot, Napoleon's Minister for War. This unusual structure protected the exterior slope and the terreplein behind it, and was loopholed for use by defending marksmen. Entry to the narrow walkway on top of Fort Clinch's was provided by four passageways, tunneled through the earthen rampart. The design was unsuitable for larger casemated forts, and in Fort Clinch, the main ordnance battery was concentrated on the terreplein.

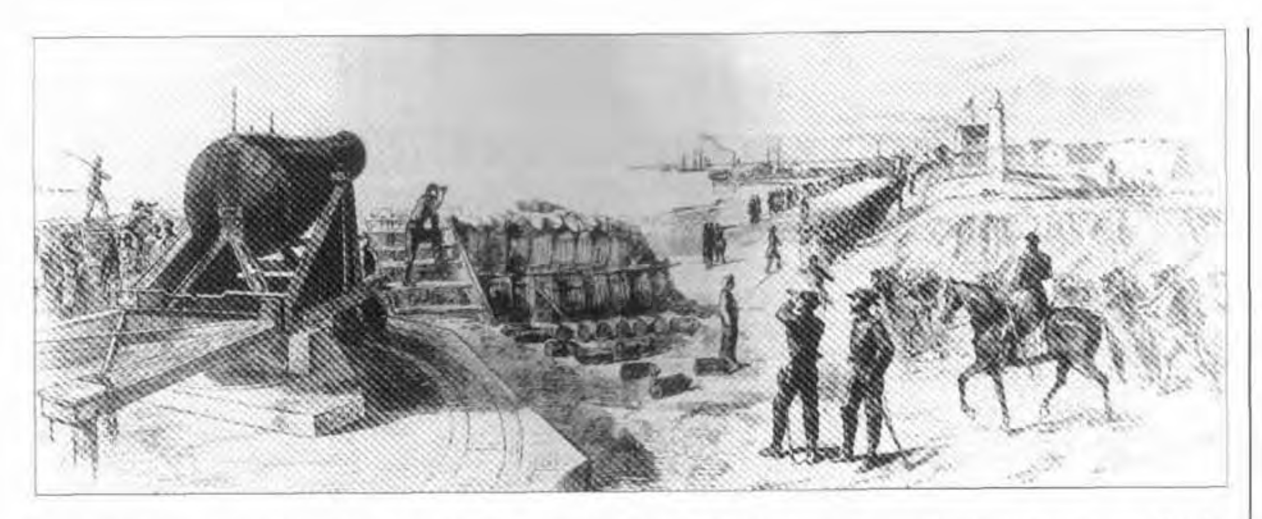
A tour of a Third System fortification

The large and imposing coastal fortifications of the Third System were designed to conform to long-held principles of military engineering. As such, they displayed features that could be found in the Vauban forts built across Europe over two centuries earlier, and certain features were continued on into the 20th century when the U.S. Army built a new series of coastal defenses.

The main component was the deployment of a large battery of ordnance on the seaward side of the fortification, while also protecting the landward side from assault by enemy storming parties. As has already been discussed, the chosen material used to construct these great fortifications was masonry, either granite blocks or, more commonly, brick. The ability to deploy a significant battery of ordnance on the seaward side of the fortification was made possible by the emplacement of the guns and their carriages in casemates – lines of gun emplacements built from masonry and protected by bombproof roofs. In most cases, casemates were left exposed on the inner face, the one facing the central parade of the fort. These were usually stacked one on top of the other creating multiple tiers of two or sometimes three casemates. The curtain wall of the fort behind these casemates was pierced with rows of embrasures, each permitting a limited traverse for the gun located behind it. This was the key to the defensive principle of these Third System forts. Each seaward-facing side of the fort presented an overwhelming number of guns in the direction of the expected threat. Although the ability of these guns to train left or right was restricted, the sheer number of guns meant that many pieces could bear on a target at any one time. The polygonal design of the fort ensured that for the most part each side of the fortification would have a clear field of fire to its front, and out to each side at an angle of 30° to the front of the structure. The angles forming the apex of these sides (known as the salient) were not always the same, as different fort designs led to different configurations of curtains, salients and other features. Ideally, the angle was shallow enough to allow the guns on each side of the salient to provide some degree of covering fire to each other, thereby preventing

In this general view of Hampton Roads and the mouth of the James River, the dominating position of Fort Monroe in the foreground is clearly evident. Connected to the mainland of Virginia's Peninsula by a small neck of land and a causeway, the fortress acted as a vital bastion for the Union Army within a week's march of Richmond. (Stratford Archive)





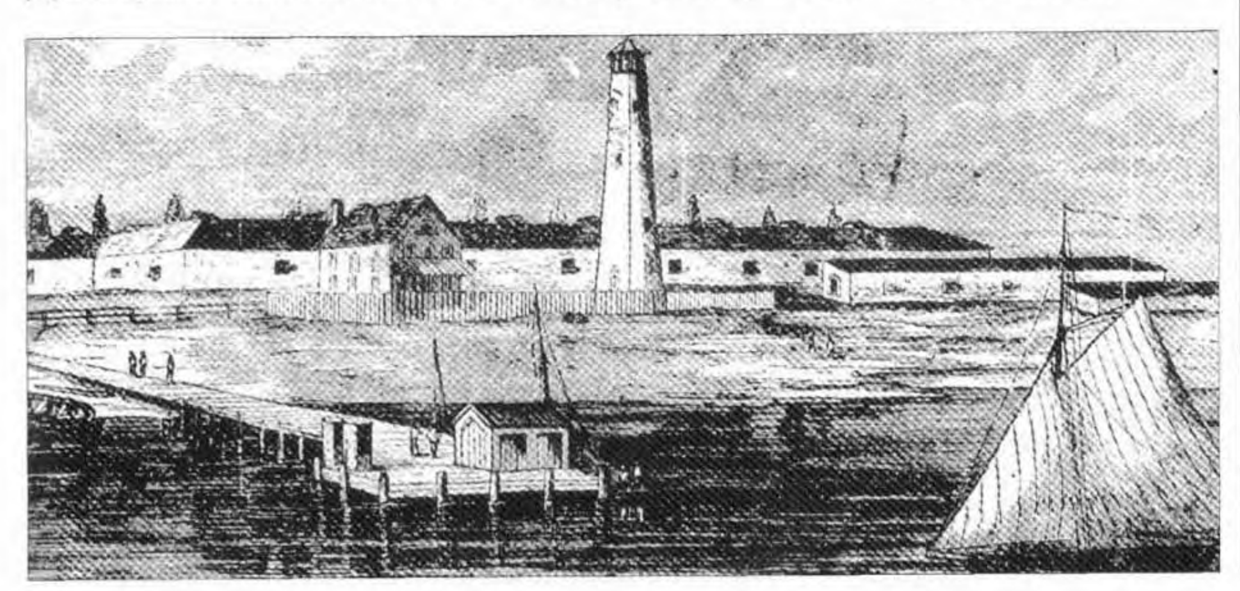
a dead zone extending outwards from the salient. In practical terms, this was nearly impossible, and the front salient of most forts of the Third System remained vulnerable in this area. On top of the casemates a flat open area known as the terreplein served as a bombproof covering to the casemates below it. In most forts, an additional battery of guns was mounted on this terreplein, protected from direct enemy fire by a parapet. As these guns were often fired over the top of the parapet rather than through an embrasure, these pieces usually had less restricted fields of fire than the casemate guns below them. This meant that guns could be sited to help cover the dead zone created by the angle of the salient.

In this view of the outer works of Fort Monroe, an enormous 15-inch Rodman smoothbore is sited to cover the beach on the eastern side of the fort. (Stratford Archive)

In some of the earliest Third System forts built in the United States, the salient was protected by a projecting bastion, a flanking structure that extended beyond the curtain (or scarp). While this provided extra protection for the vulnerable corner of the fort, its primary purpose was to allow defenders to fire along the line of the outer scarp of the fort using small arms of artillery loaded with grapeshot. This made any attempt to scale the walls of the fort virtually suicidal.

Attackers were presented with a range of obstacles, designed to hinder their approach to the fort, and in some cases to protect its walls. Although the physical layout of forts varied, some were surrounded by sea, swamp or moat,

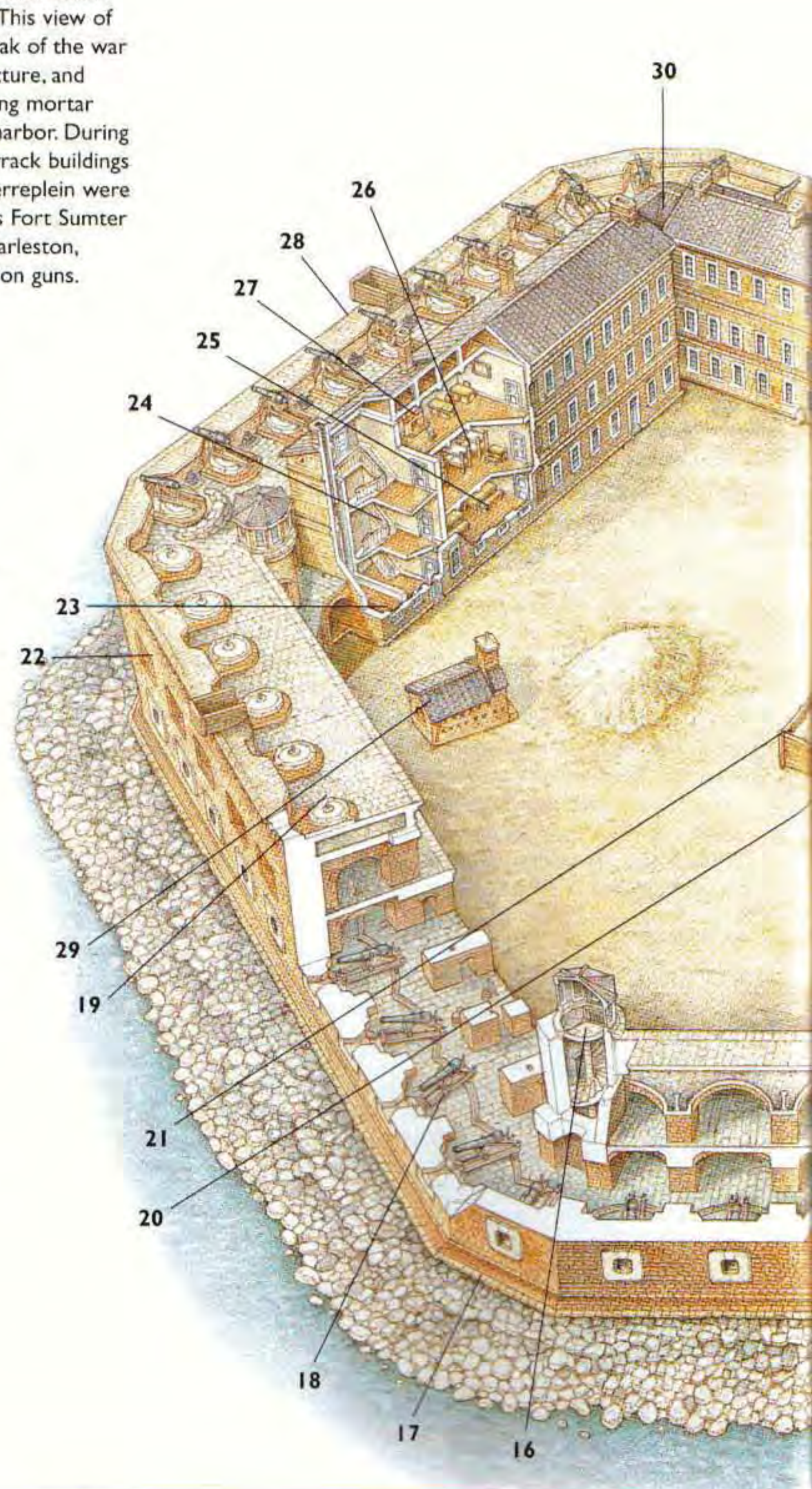
Fort Monroe was relatively isolated for the first year of the war and had to be re-supplied by sea. Note how the casemate guns of a water battery to the right of the picture are positioned to cover the landing stage. (Stratford Archive)

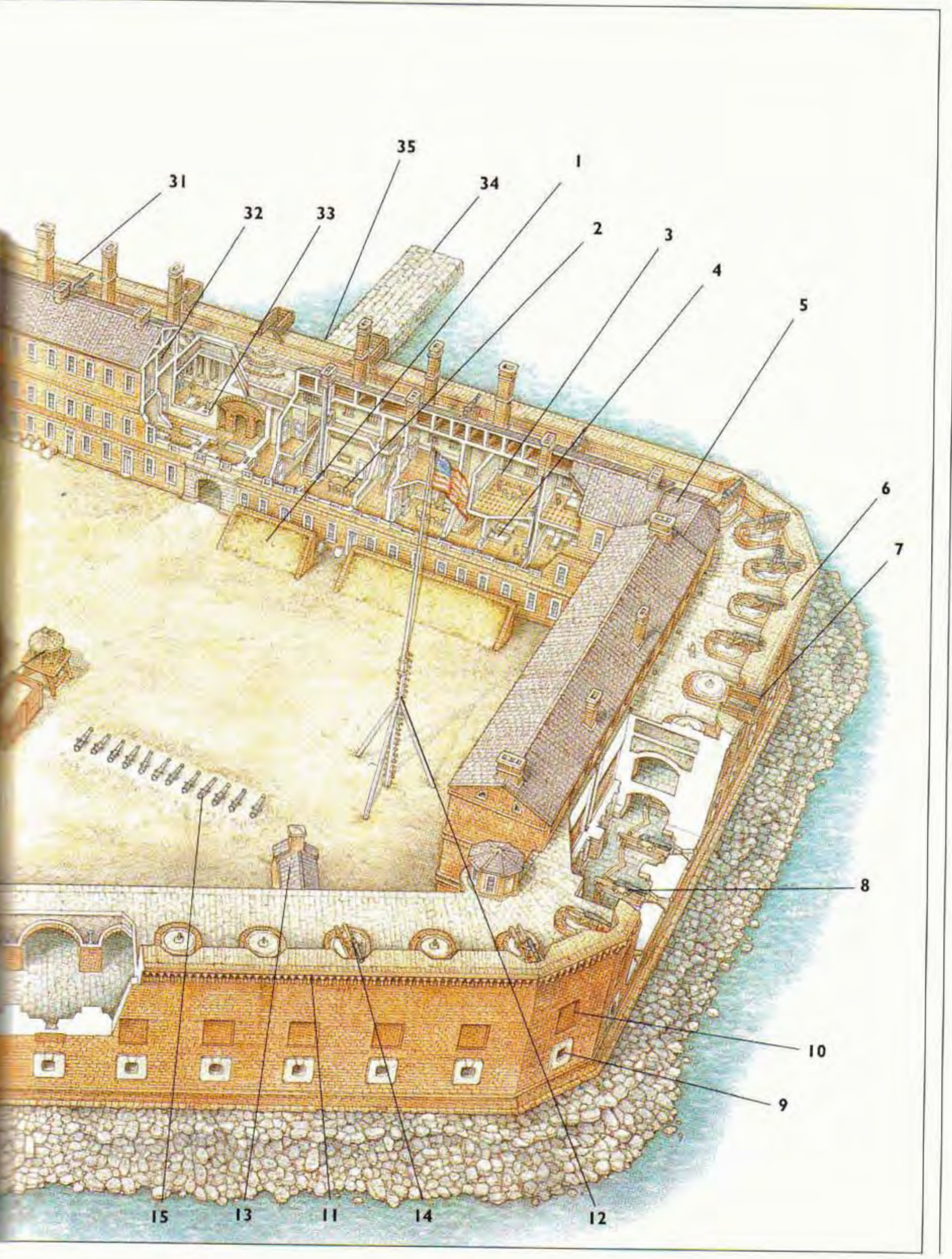


Fort Sumter

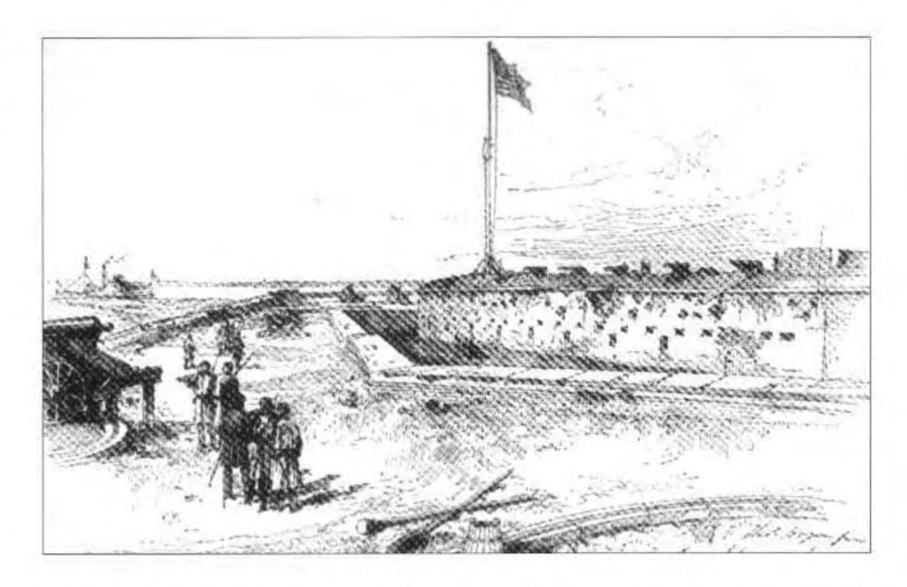
Fort Sumter, built to protect the port of Charleston, South Carolina is best known for the role it played at the start of the Civil War, where its small Union garrison was bombarded for two days. This view of the fort immediately before the outbreak of the war shows the imposing nature of the structure, and demonstrates its vulnerability to plunging mortar fire from batteries ranged around the harbor. During the Confederate bombardment the barrack buildings were destroyed, and the guns on the terreplein were put out of action. In Confederate hands Fort Sumter continued to help in the defense of Charleston, despite being reduced to rubble by Union guns.

1 Bombproof traverses
2 Officers' dining rooms
3 Fort commander's private quarters
4 Officers' quarters
5 North west stairwell
6 Northern scarp
7 Sharpshooter's platform
8 Smoothbore columbiad on wooden garrison carriage
9 Lower casemate tier
10 Upper casemate tier
11 North east scarp
12 Flagpole
13 Hot-shot furnace
14 Columbiad smoothbore on *en barbette* carriage
15 Unmounted ordnance
16 Central stairwell tower
17 The salient
18 Rodman smoothbore on iron casemate carriage
19 Terreplein
20 Belfry
21 Grit boxes
22 South east scarp
23 Cookhouse store
24 Internal stairway
25 Enlisted mens' dining hall
26 Enlisted mens' barrack rooms
27 Offices
28 Southern scarp
29 Magazine
30 South-western stairwell
31 Gorge wall
32 Offices
33 Officer's quarters
34 Stone-built jetty
35 Sally port





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A view from the north east corner of the terreplein of Fort Macon after her surrender in March 1862. The majority of the damage to the terreplein battery and the parade came from mortar fire, while the west scarp of the fort was subjected to the direct fire of the besiegers' rifled guns. (Stratford Archive)

the same basic layout of outer works was used wherever the terrain permitted. The following description outlines the basic structure and the principles applied to its design and use.

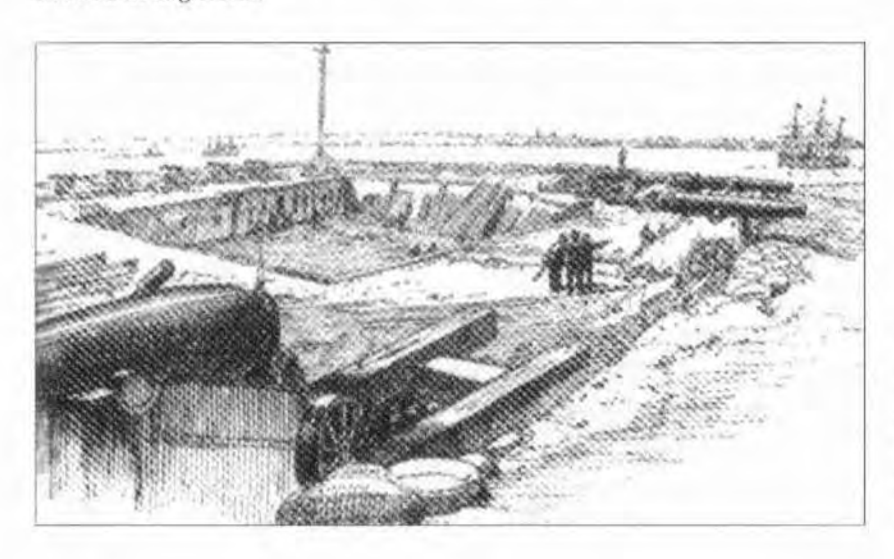
First, an earthen glacis sloped up from ground level. This usually led to a brick-built wall, known as a "revetment." In theory, defenders armed with small arms could shelter behind this revetment and fire on troops advancing towards them. Behind the revetment was a strip known as the "covered way," which, rather confusingly, neither led anywhere nor was covered. Its purpose was to allow defenders holding the outer revetment of the fort to move around the perimeter of the fortification in order to react to an anticipated attack. Clearly, if the fort itself was polygonal in shape, the glacis, revetment and covered way would be constructed to reflect the angles of the fort, and any of its projecting bastions. For example, if the fort formed a hexagon, five salients or angles, in the outer defenses rather like the shape of a star, would mirror the angles of the fort. This also allowed defenders in these salients (known as "salient places of arms") to fire into the flank of attackers storming the front of the works. Smaller salients were sometimes constructed in the center of the outer defenses, midway between the main salient places of arms. On the side of the fort where the main entranceway (or "sally port") to the fort was located this small salient was larger than usual, and was known as the "re-entering place of arms." A gap in the revetment and glacis provided the main means of access in and out of the fortification.

Behind the covered way was the ditch or moat. These could be wet (water-filled) or dry. On the inner side of the moat was the main wall of the fort (known as the "scarp"), and on the inner side was the "counterscarp," a brick revetment at the inner edge of the covered way. In some cases this basic design varied due to local conditions. At Fort Jefferson, on the Dry Tortugas, the covered way and counterscarp became a low narrow ledge separating the moat from the sea or beach beyond it. In this case, its function was more to break the force of waves crashing against the fort than to serve any defensive purpose. At Fort Jackson, below New Orleans, the moat was water-filled, and the outer works were a narrow zigzag strip of land between this formal moat and the irregularly shaped flooded ditch that lay outside the works. In effect, this acted as a second moat. Not every fort enjoyed the protection of outer works and a moat, but the efforts made to construct these features in the two examples mentioned above underline the importance the Bernard Board placed on these outlying defensive works. In some forts with dry moats, the counterscarp contained a small fortified gallery running along its length, hidden beneath the covered way itself. This

brick-built structure was pierced with loopholes. If it looked as if an attacking force was about to capture the covered way, the defenders could descend into the moat and blockade themselves in the counterscarp galleries. While small arms and grapeshot from the main structure of the fort would sweep the dry moat, defenders hidden in the counterscarp galleries (also known as "counter fire rooms") could fire into the backs of the storming parties as they attempted to scale the scarp of the fort. In Fort Monroe in Virginia, parts of the covered way were replaced by a single tier of casemates (known as the water battery), while a small walkway ran along the back of them, which linked the casemates to the rest of the outer works.

On the side of the fort where the sally port was located, a drawbridge spanned the moat, linking the fort to the outer works. Usually this structure was a simple wooden affair, and could be destroyed by the defender if the outer works were captured. Sometimes a "ravelin" was built in the moat to serve as an additional form of protection for the sally port. This was essentially a triangular-shaped detached bastion, linked to both the fort and the covered way by drawbridges. Like the larger bastions of the main fort, this outer work was topped by a parapet, making it a small fort in its own right. This was a feature that was commonly found in forts of the Vauban era such as the Castillo de San Marcos in St. Augustine, Florida, but these works were relatively uncommon in most Third System fortifications.

Beyond the moat was the main structure of the fort itself. The casemates formed the scarp, or main brick-built outer wall of the fort. Obviously this was pierced by rows of embrasures or gunports, often protected by steel shutters that could be dropped into place to protect the guns behind them. The casemates behind formed a series of arched galleries, which were usually left exposed to the rear. In some cases, simple wooden screens were constructed on the rear face of these casemates to protect the guns and crews from the weather. Although the number of casemate tiers varied from one to three (one or two being the most common), the roof of each casemate was designed to carry both the weight of any ordnance placed on it, and to protect the casemates beneath it. A series of brick barrel-vaulted arches divided each gun bay, and provided internal protection in case part of the casemate was hit by an exploding mortar bomb or shell. While in most cases a series of arches ran at right angles to the line of the scarp, additional arches on the rear face of the casemate acted as further support for the roof above. Each arch of the vaulting was designed to distribute the immense weight of the floors equally between the outer walls and the columns at the rear of the casemate. On all casemate tiers, the floor was covered in flagstones.



A solitary medium smoothbore gun (probably a 36-pounder) mounted on an *en barbette* carriage remains in place after the scarp protecting the casemates and the rampart and superior slope covering the terreplein of Fort Pulaski were demolished by Union rifled guns. (Stratford Archive)

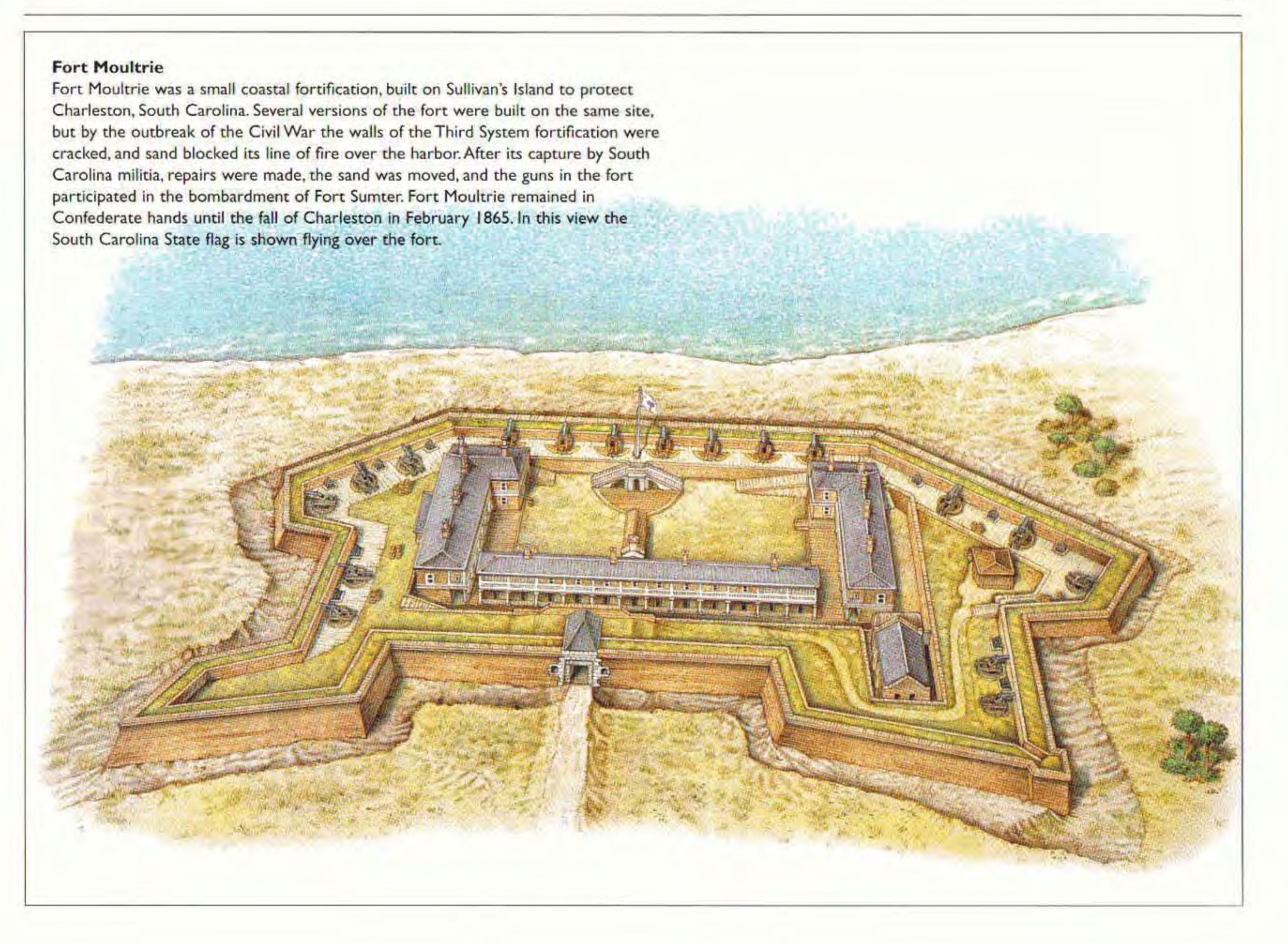


Fort Pulaski, Georgia, sketched immediately after its surrender in April 1862. The damage inflicted by the rifled guns was concentrated on the seaward salient, at the apex of the two main casemate walls. The solitary *en barbette* gun on the skyline marks the point of aim for the Union gunners. (Stratford Archive)

A flat roof known as the terreplein (which was roughly equivalent to the battlements or ramparts of a medieval castle) topped the rear of the upper casemate. This stone-flagged area was protected from the direct fire of any attacker by a brick parapet, while in front of it a sloping earth-filled rampart (known as the "superior slope") provided solid protection for the gunners and soldiers on the terreplein. Compared to the casemates beneath, the terreplein was a small area, approximately half the size of the casemates, as the rampart took up the rest of the area. The rampart itself acted as a glacis, and was usually angled, falling away slightly for a few feet, then dropping sharply to meet the outer face of the scarp. The join between the rampart and the scarp was known as the "cordon," and was often reinforced by a top course of masonry that also served to prevent water damage to the casemates and scarp. Often a small step at the base of the parapet allowed marksmen to fire, as the height of the structure was usually too high to permit a soldier to level his rifle, due to the need to protect the gunners on the terreplein.

On some forts, an additional curtain wall (known as a "detached scarp," or "Carnot's wall") rose up from the top of the scarp, acting as an additional barrier. The top of this brick-built structure was usually a little lower than the top of the earthen rampart behind it, and was separated from the superior slope by a narrow walkway (known as the "chemin de ronde"). The detached scarp was usually loopholed for use by marksmen, while a passageway or gallery underneath the rampart provided access to the interior of the fort. This feature was incorporated into the defenses of Fort Clinch on Amelia Island, Florida, a pentagonal fortification built between 1847 and 1861.

The center of a fort was occupied by a large open space known as the "parade." While this was used as a drill ground, it was also often used to house barrack blocks, storehouses, a shot-heating furnace, water cisterns, magazines and other structures, as well as a flagpole. Occasionally, forts omitted a conventional parade ground, and the central area was filled with soil or sand to improve the protection afforded to the casemates. In these cases, the fill of the parade area sloped down towards the rear of the fort, where a series of offices, stores and buildings abutted the landward scarp. The Advanced Redoubt built to augment the defenses of Pensacola, Florida, between 1845 and 1859 was constructed along these lines. While this solution offered the best protection against mortar bombs, more conventional System Three forts were left vulnerable to indirect fire from explosive shells or bombs lobbed over the walls into the parade. Consequently in time of war, a series of pits was often dug in the parade to contain the blast from these shells, and earthen banks were raised to protect the rear faces of the magazine and the casemates. Freestanding buildings in the interior of the fort were built along conventional mid-19th-century lines, and usually consisted of long two- or three-storied buildings topped with gabled tile roofs. The magazine building was usually well protected by a surrounding blast wall, or in some cases (as in Fort Moultrie, South Carolina), the structure was built in a slot cut in one of the protective bastions. In the event of a direct hit on the magazine, the stout walls of the building were designed to stay in place, encouraged by extensive buttress work. This directed the blast upwards through the roof, therefore limiting the damage to the rest of the fort. At least that was the theory. In practice, forts



Fort Moultrie

Fort Moultrie was a small coastal fortification, built on Sullivan's Island to protect Charleston, South Carolina. Several versions of the fort were built on the same site, but by the outbreak of the Civil War the walls of the Third System fortification were cracked, and sand blocked its line of fire over the harbor. After its capture by South Carolina militia, repairs were made, the sand was moved, and the guns in the fort participated in the bombardment of Fort Sumter. Fort Moultrie remained in Confederate hands until the fall of Charleston in February 1865. In this view the South Carolina State flag is shown flying over the fort.

under attack by indirect fire such as Fort Jackson and Fort St. Philip on the Mississippi River distributed their powder and shot around the casemates, where it was thought they would be better protected. In forts with bastions, small ready-use magazines were housed in these structures, as was the case in Fort Jefferson on the Dry Tortugas. Naturally, the lower levels of the bastions housed guns designed to fire along the line of the moat covering the approaches to the scarp.

In some forts the barrack rooms and officers' quarters were located on the landward face of the fort, a structure sometimes called a "redan." This was often pierced by the sally port, which split the redan into two equal parts. Forts built in this manner include Fort Sumter, South Carolina; Fort Schuyler, New York; Fort Pulaski, Georgia; Fort Zachary Taylor, Florida, and Fort Carroll, Maryland. In a number of other forts, buildings were concentrated inside a central citadel, which served as a final line of defense. Built like a medieval keep, these square or round structures contained a lower floor of storerooms and kitchens, while upper floors contained barrack rooms, officers' quarters and offices. Like the Martello Towers found in smaller fortified sites, these structures could be topped by a parapet and fighting position or by a tiled roof.

While the rear defenses of most forts varied greatly, the latest military thinking of the 1840s called for a distinction to be made between the moat on the seaward and flanking sides of the fort, and the moat on the landward side. In the Advanced Redoubt at Pensacola, the two areas were separated by additional structures; low passageways that ran across the moat and connected the inner and outer works. This structure was known as a "caponnier," combining the function of a covered passageway with that of a defensive position. The idea was that soldiers retiring from the outer defenses could enter the capponiers, then fire through loopholes in either side when enemy troops reached the moat. Some were simply a pair of open-topped parapets, but most took the form of brick-built passageways above ground. These structures divided the landward area of the moat from the other sides. In these cases, the moat on the landward side was referred to as a "gorge."

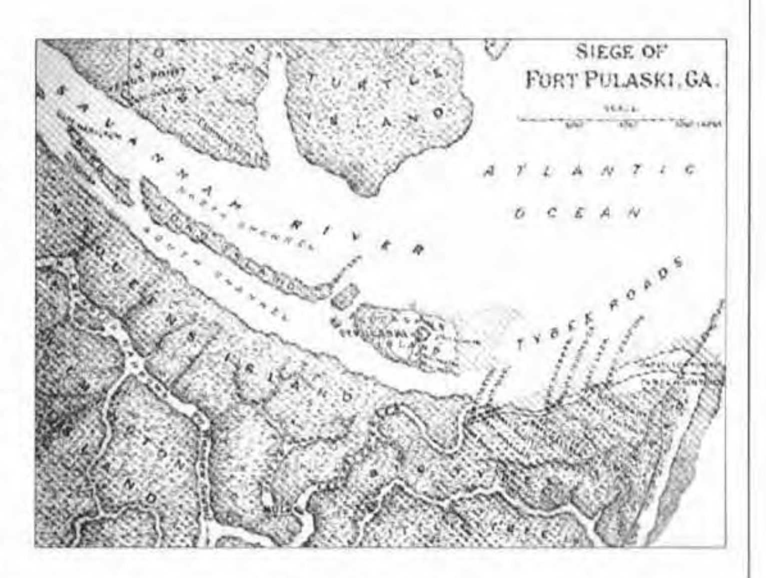
Any assault on a well-fortified and fully manned Third System fortification would have been a prohibitively costly operation. Although the structures varied from location to location, the general principles of defense remained the same. The only flaw in the whole design was that by 1861, attackers no longer needed to launch costly attacks on these fortifications. Advances in weapons technology meant that in most cases, they could simply be shelled into submission.



In this view of the interior of Fort Pulaski after the siege of April 1862, a 10-inch mortar lies half-buried by debris on the terreplein of the south-east face of the fort. In the background the smoothbore gun pointing skyward marks the salient of the two faces of the seaward side of the fort. This was the point where the Union gunners concentrated their fire. (Stratford Archive)

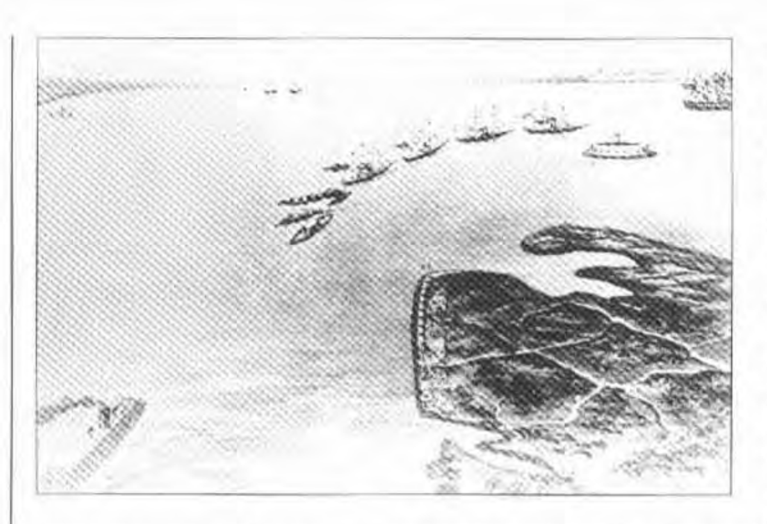
Principles of defense

The sole reason for the existence of these fortifications was to protect an important strategic location, such as a seaport or a river mouth. This meant that the structures were sited where they could offer the best defense, regardless of the accessibility of their location. While some were built on small islands or spits of land, others were constructed on the shore, where they were theoretically vulnerable to land attack. This meant that while the main seaward battery remained the principal means of defense against attack, it was integrated into a well-developed plan for the overall defense of the fortification.



In this contemporary map of the siege of Fort Pulaski, Georgia, the location of the Union batteries on Tybee Island can be seen to the south east of the fort on Cockspur Island. The fort guarding the entrance to the Savannah River was forced to surrender by concentrated fire from Union rifled artillery, firing at a range of just over a mile. (Stratford Archive)

While the forts were clearly effective in presenting a large number of artillery barrels at an enemy ship, this effectiveness was intrinsically linked to the abilities of the guns themselves. During the Third System period, from 1817 to the end of the Civil War, the size and type of guns placed in these forts changed. While attempts were made to standardize this arsenal of coastal ordnance and to introduce uniform types of carriage, the ordnance held in individual forts varied enormously. The most commonly installed gun during the early decades of the Third System was the 24-pounder smoothbore introduced in 1819. The maximum range of this piece was a little over a mile at 6° of elevation, but effective range against a wooden ship-of-the-line was approximately half that at 800 yards. This meant that the entrances to many of the more important harbors were too large to be effectively covered by a single fort, thus creating the need for multiple fortifications, with interlocking fields of fire. This was the reason that Fort Sumter was built to defend Charleston Harbor. Fort Moultrie protected the northern side of the main ship channel but was unable to cause damage to ships that hugged the southern side of the harbor entrance, so Fort Sumter was built to cover the gap, with work beginning in 1829. By this stage, developments in artillery had led to an increase in the defensive potential of these fortifications. The 32-pounder of 1829 and the 42-pounder of 1831, which had become the mainstay of coastal artillery batteries by the 1830s, were considered powerful enough to pierce the hull of any enemy warship. That said, their range was not significantly greater than the 24-pounder introduced a decade previously (the 42-pounder had a maximum range of 2,200 yards). Although these guns were certainly impressive, their effectiveness against ships was initially limited as they only fired solid roundshot. To improve the shot's impact it was heated in an oven before firing. The red-hot shot would then smash its way into a wooden ship setting it on fire. Given the speed of wooden sailing ships of the period, a fort's gunners had plenty of time to prepare their guns, heat the shot and then engage the target. The next innovation came in 1841, when 8-inch and 10-inch howitzers capable of firing explosive shells were introduced into coastal batteries. These advances improved the ability of the gunners to inflict damage upon the enemy, but the introduction of the columbiad system of ordnance in 1844 permanently altered the strategic importance of coastal fortifications. A 10-inch



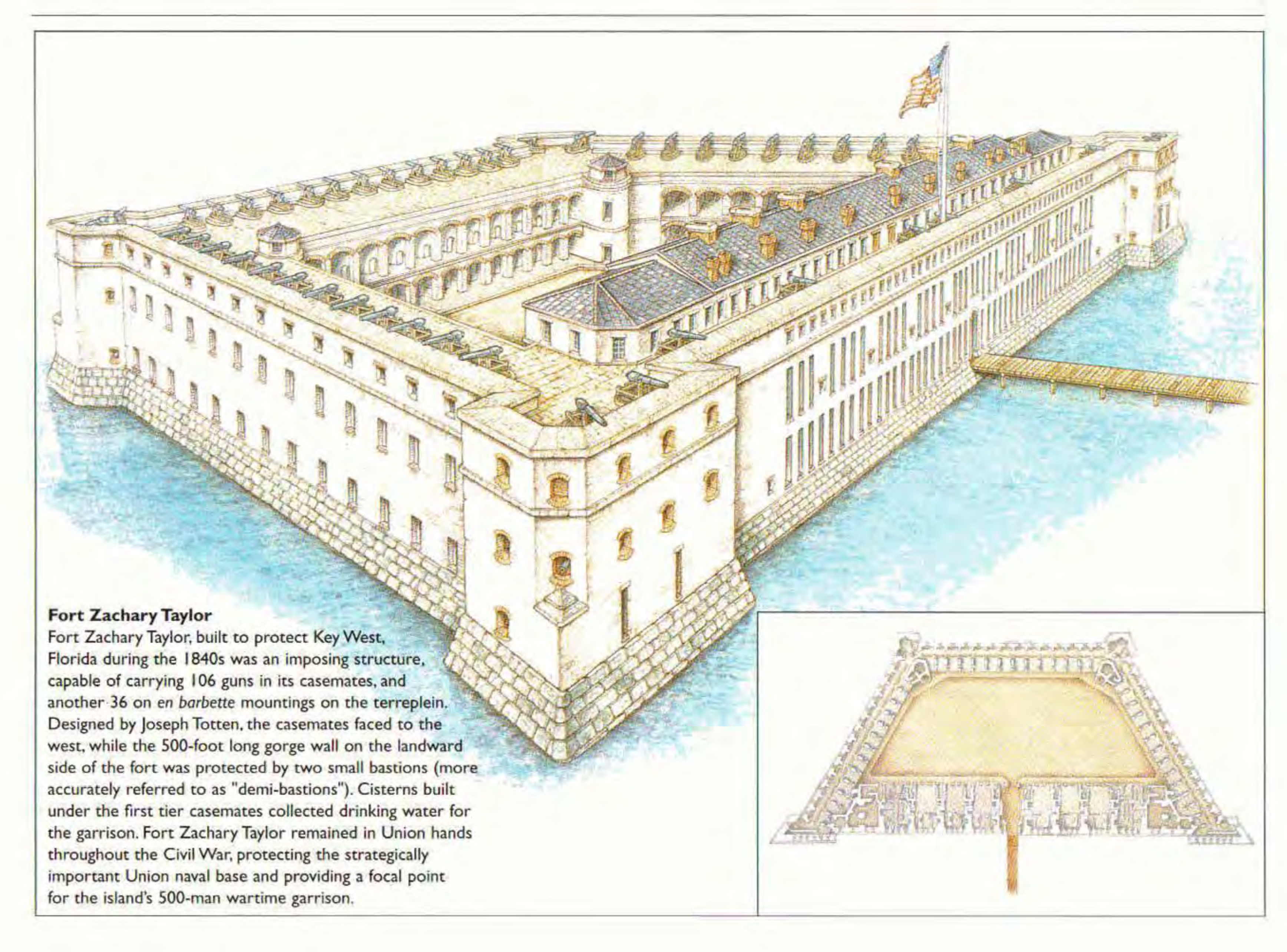
ABOVE In this rarely seen depiction of Hampton Roads, the ironclad CSS *Virginia* can be seen chasing the Union fleet (including the ironclad USS *Monitor*) from the mouth of the Elizabeth River. Fort Wool (formerly Fort Calhoun) on the Rip Raps is shown in the center right of the picture, while the imposing frontage of Fort Monroe can be seen in the right background. Together, the two positions sealed off Confederate access to Chesapeake Bay. (Stratford Archive)

columbiad smoothbore was capable of firing a 125-pound solid shot or a shell up to three miles. The effectiveness of these guns was improved by the adoption of specially designed gun carriages, which permitted high angles of elevation. This meant that by the time of the Mexican–American War (1846–48), Third System coastal fortifications could engage targets at about five times the range of the same fortifications in 1825. Consequently, new forts were sited to take advantage of this improved range, while older forts were re-armed. The need for the provision of secondary batteries in large harbors was also reduced. Targets could now be engaged well before the attacking ships reached the fort, and the vulnerability of wooden ships to shellfire meant that any contest would be one-sided. This belief in the superiority of coastal fortifications over warships continued until the Civil War, when the introduction of rifled guns and ironclad warships changed the odds in favor of the attackers. This said, no Civil War fort was taken solely by a naval assault. Either naval bombardment proved ineffective, or the attackers managed to bypass the fort without serious loss. The real danger lay in land attack, either by means of a conventional land-based bombardment (such as the attack on Fort Pulaski, Georgia, in April 1862) or through an infantry assault.

To guard against an attack on the landward side, the defenses of most Third System coastal fortifications included light guns designed to repel infantry attacks. "Flank defense" guns were placed in flanking bastions and occasionally in counter-fire galleries, sited to sweep the length of the moat. If attackers managed to storm the glacis and capture the covered way, the main battery of the fort could still engage them, although the pieces were not designed as anti-personnel weapons and were not provided with anti-personnel rounds. To avoid this fire, and to carry the fight into the fort itself, attackers needed to climb down into the moat, or cross it if it was filled with water. At this point the "flank defense" guns, such as 24-pounder howitzers, would fire canister or grapeshot charges at the attackers. The effect of this close-range fire was lethal. Attackers were also subjected to small arms fire. In the unlikely event that the attackers managed to scale the scarp and capture the terreplein, they still had to engage in hand-to-hand combat, or if the fort contained a central citadel, then they had to continue the attack against another fortified position in the center of the fort.

Faced with the prospect of this type of attack, it is little wonder that Union commanders rarely attempted assaults of this kind. The exception was the attack made on Fort Sumter by Union sailors and marines on September 9, 1863. As the fort was in ruins it was expected that the effectiveness of Sumter's close-range defenses would be minimal. Instead a devastating fire met the attack and it failed. All this proved was that even when brick-built forts were reduced to rubble, their defenses were still formidable.

BELOW Fort Monroe, viewed from the wharf on its southern face. The fort acted as the launching point for General McClellan's Peninsular Campaign of 1862, and was used as a major storehouse by the Union army for the remainder of the war. (Stratford Archive)



Fort Zachary Taylor
Fort Zachary Taylor, built to protect Key West, Florida during the 1840s was an imposing structure, capable of carrying 106 guns in its casemates, and another 36 on *en barbette* mountings on the terreplein. Designed by Joseph Totten, the casemates faced to the west, while the 500-foot long gorge wall on the landward side of the fort was protected by two small bastions (more accurately referred to as "demi-bastions"). Cisterns built under the first tier casemates collected drinking water for the garrison. Fort Zachary Taylor remained in Union hands throughout the Civil War, protecting the strategically important Union naval base and providing a focal point for the island's 500-man wartime garrison.

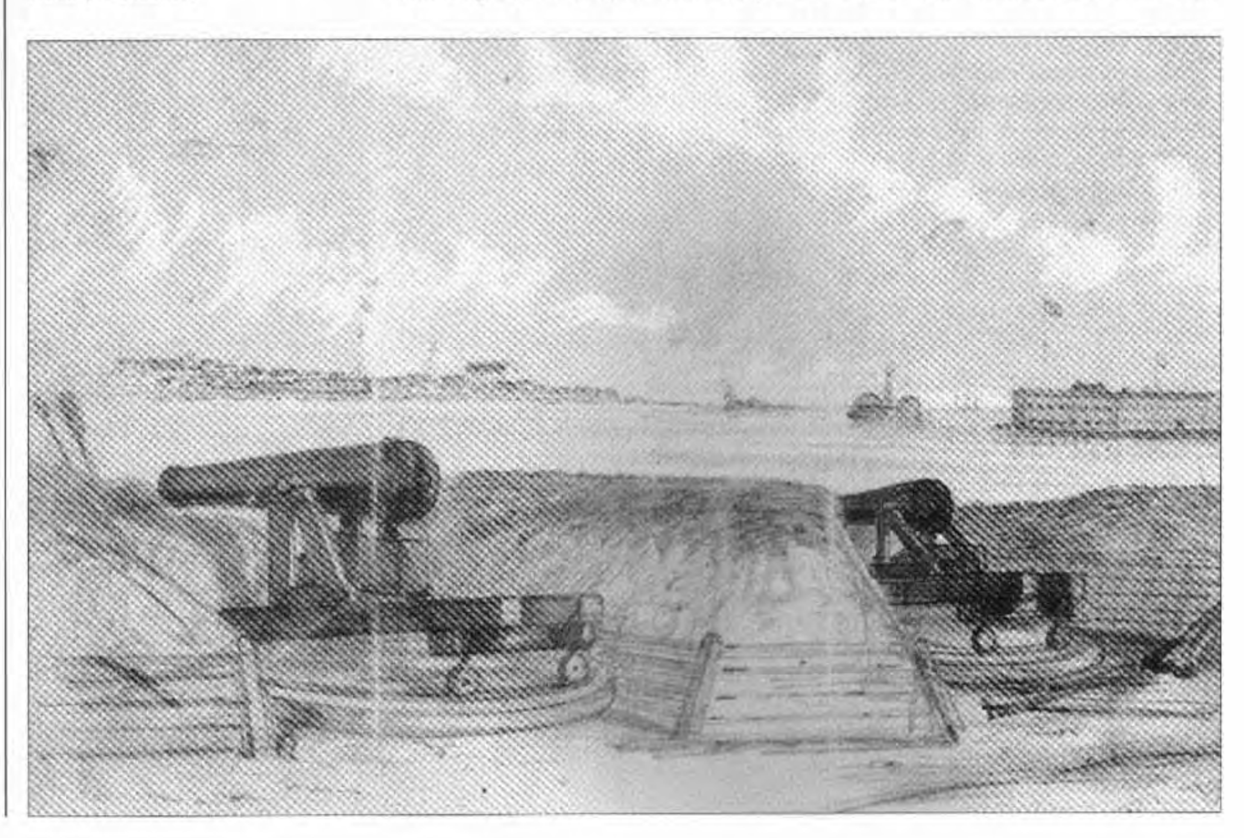
The living fort

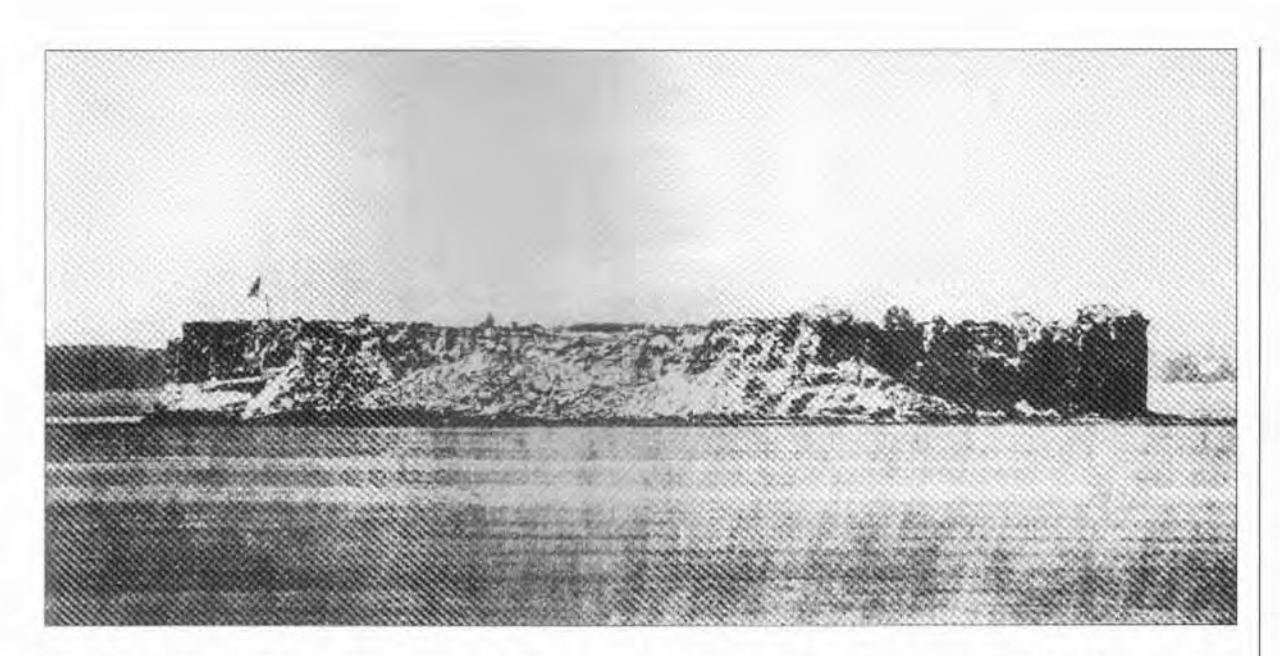
Garrison life

During the decades before the Civil War, garrison life in the great coastal fortifications of the United States was a dull, if not particularly arduous, occupation. No fort of the Third System was garrisoned to its full capacity until the Civil War, instead a nominal garrison of company strength was usually assigned to each one. Others were only garrisoned intermittently, and left in the hands of small caretaker detachments for years on end. In theory, coastal fortifications were the responsibility of the First U.S. Artillery regiment based at Fort Moultrie, South Carolina, although the upkeep of the structures was left in the hands of the U.S. Corps of Engineers. Regular tours of inspection were carried out by the Board of Engineers and the U.S. Army Board of Ordnance, who were responsible for the armament of the coastal forts. In addition, engineer officers were often seconded to fort garrisons. For example, 2nd Lieutenant Robert E. Lee was stationed at Fort Monroe, Virginia, between 1831 and 1834. For the ordinary soldier garrison life meant drill, the maintenance of the fort and its guns, and sentry duty. Close contact between the garrison and the local community meant that if the routine was dull, at least the garrison troops were kept well supplied with the necessities of life, such as food, alcohol and tobacco.

If service in the forts was mundane for the gunners, conditions for the officers were slightly more pleasant. Many lived with their families in the Officers'

A view of Fort Sumter in Confederate hands, sketched by an artist working for the *Illustrated London News*. From this viewpoint at Battery Simkins, on James Island, Fort Moultrie can be seen across Charleston Harbor to the left of Fort Sumter. (Clyde Hensley Collection)



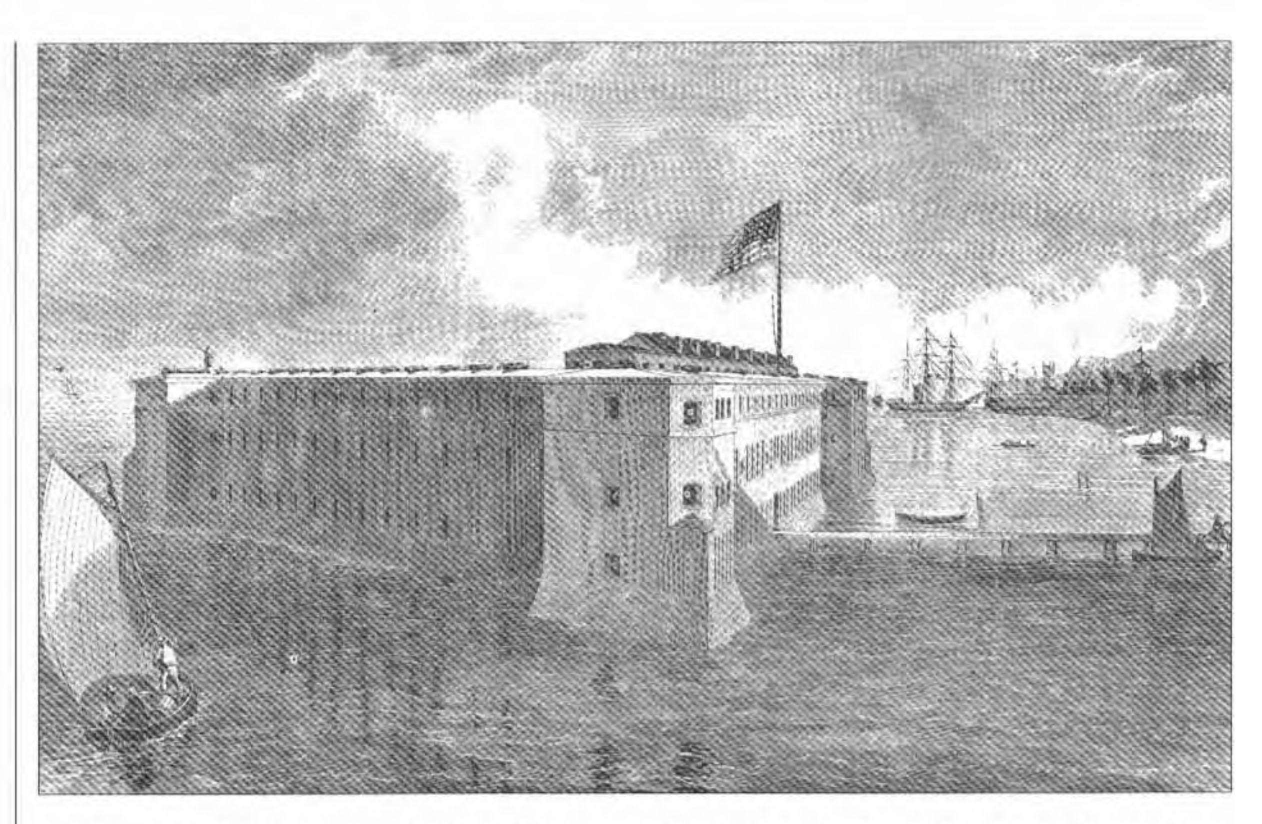


In September 1863, Union batteries began a week-long bombardment of Fort Sumter, hitting her casemates with at least 560 heavy shells. Despite the extensive damage to the fort, the garrison remained ready to defend against any attack, and even managed to operate the lower casemate guns. (Clyde Hensley Collection)

Quarters, and enjoyed a relatively pleasant social life with well-appointed billets inside the fort, or in rented accommodation outside the fort walls. Immediately before the Civil War, Brevet Lieutenant-Colonel John B. Magruder, commanding Company I of the First U.S. Artillery Regiment, was stationed at Fort Adams, Rhode Island. He reputedly turned the fort into a venue for social gatherings, and the local Newport newspaper of 1857 recorded that the sound of music could often be heard coming from Fort Adams as the Virginian officer hosted parties. This ended when the garrison was withdrawn in 1859 and the fort was maintained by a small caretaking party.

During the period immediately before the Civil War, the majority of coastal fortifications in the United States were garrisoned by companies that were barely sufficient to man their defenses. For example, in Fort Moultrie, South Carolina, Brevet Colonel John L. Gardner of the First U.S. Artillery Regiment commanded a garrison of two under-strength artillery companies and a regimental band: 13 officers, 61 gunners and 13 musicians. In order to fully man its batteries, the fort required a garrison of over 300 men. As Fort Moultrie was the headquarters of the First U.S. Regiment of Artillery, it was the exception to the rule. Fort Sumter was unoccupied save for an Ordnance Sergeant and his family. At Fort Zachary Taylor, Key West, the garrison was a mere detachment of 24 men. Given that the structure was designed to house 142 guns, the garrison was understrength by almost 500 men.

Conditions in Fort Sumter in the days before the first shots were fired were bleak. The small garrison was hard-pressed to bring the previously unoccupied fort to a condition where it could withstand a Confederate attack. Cut off from the shore, the small garrison lived on a diet of salt pork and biscuit. As no candles were available, evenings were spent in darkness. When the wife of Captain Doubleday came out from Charleston to visit her husband, he was forced to break up a table for firewood to keep her warm. When the bombardment of the fort began on April 12, 1861, the garrison resisted for two days before surrendering. South Carolina state troops then garrisoned the fort, which remained in Confederate hands until February 1865. Following the outbreak of war garrison size increased dramatically. State volunteer regiments were sent to garrison the fortifications in both the North and the South, while artillery officers raced to prepare the fortifications for action. For example, the first Confederate commander of Fort Moultrie was Lieutenant-Colonel William G. de Sausure, commanding a force of 225 men from the Washington, German,



Fort Zachary Taylor, Key West, Florida, from a drawing "by a member of the garrison." Viewed from the southern end of the gorge face, the fort was built to dominate the only seaward approach to the island through the coral reefs, sandbars and mangrove islands surrounding this strategically important position between the Gulf of Mexico and the Florida Straits. (Stratford Archive)

Marion and Lafayette Batteries of the South Carolina militia. Many of these men had little practical experience of fortifications or heavy ordnance when the war began.

For the Confederate garrison, life in Fort Sumter was little better than it had been for the fort's previous occupants. For 20 months, from July 1883 until February 1865, Fort Sumter was subjected to bombardment from Union batteries. As one soldier recorded: "The fort, gloomy when first built, was now gloomier than ever." Repairs were carried out at night, while others clustered round fires in the rubble of the shattered fort. Sentry duty was a risky business, involving the exposure of sentinels on the top of the walls. The rest of the garrison remained under cover. The only relief came when the garrison was rotated with troops from Charleston every few weeks. Even in these trying conditions the garrison attempted to maintain the semblance of routine and even found time to improve their lot. On Christmas Day 1863, the garrison treated itself to a Christmas dinner served on the carriage of a dismounted 10-inch columbiad smoothbore.

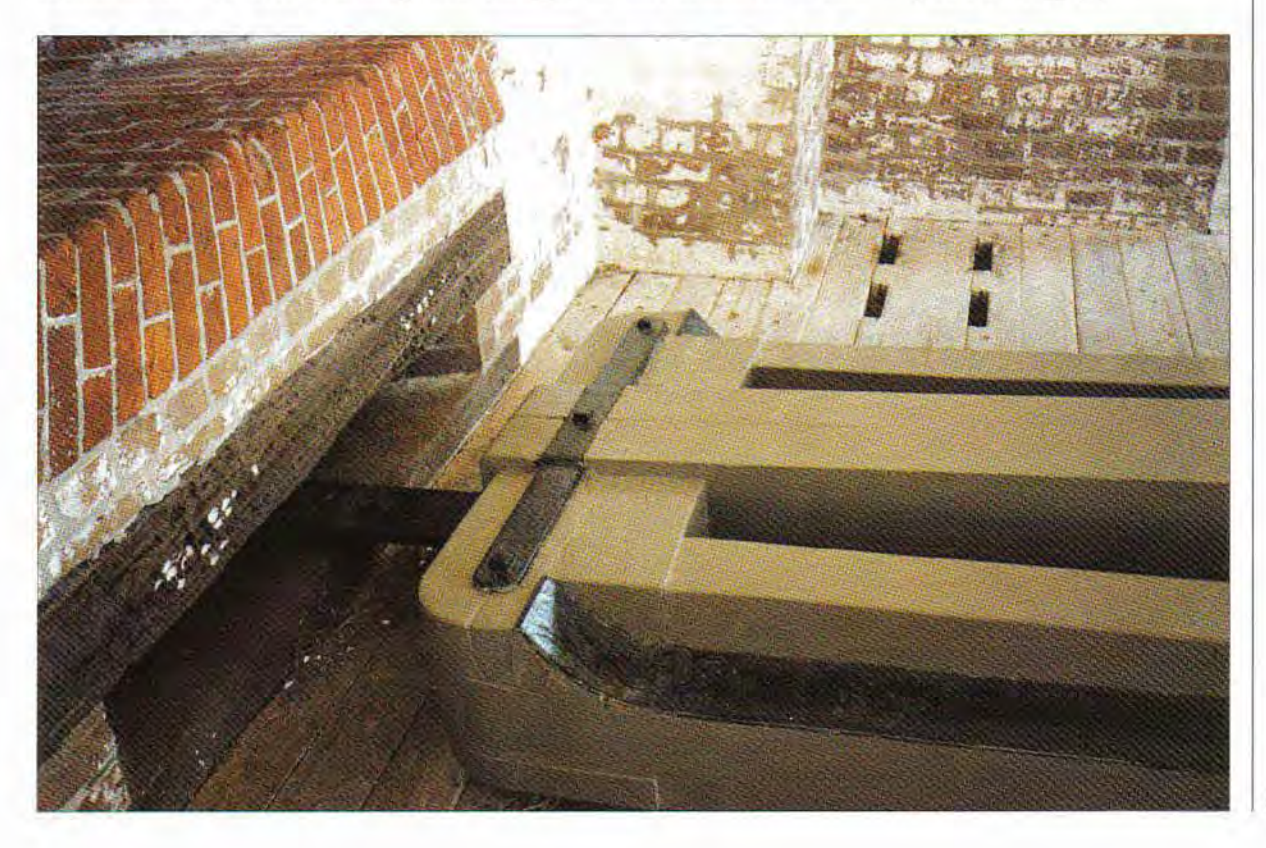
In less hazardous posts garrison life became a matter of routine, although the forts themselves hummed with activity, particularly in the north, where many served as depots for newly raised state volunteer regiments. Others were used to subdue the local population during pro-Confederate demonstrations in Baltimore and anti-draft riots in New England. They were also used as prison camps. For example, Fort McHenry outside Baltimore was used as a temporary prison for over 7,000 Confederate prisoners after the Battle of Gettysburg in July 1863. For the Confederates, the garrisoning of forts was altogether a more haphazard business. In 1861, while Florida State troops held Fort Marion and Fort Clinch, troops of the Confederate Army occupied Fort Barrancas and Fort McRee. This mix of troop types and authorities was repeated throughout the Confederacy during the first year of the war. Acute shortages of supplies, ammunition, guns and even men would continue to plague Confederate garrisons throughout the war.

Manning the guns

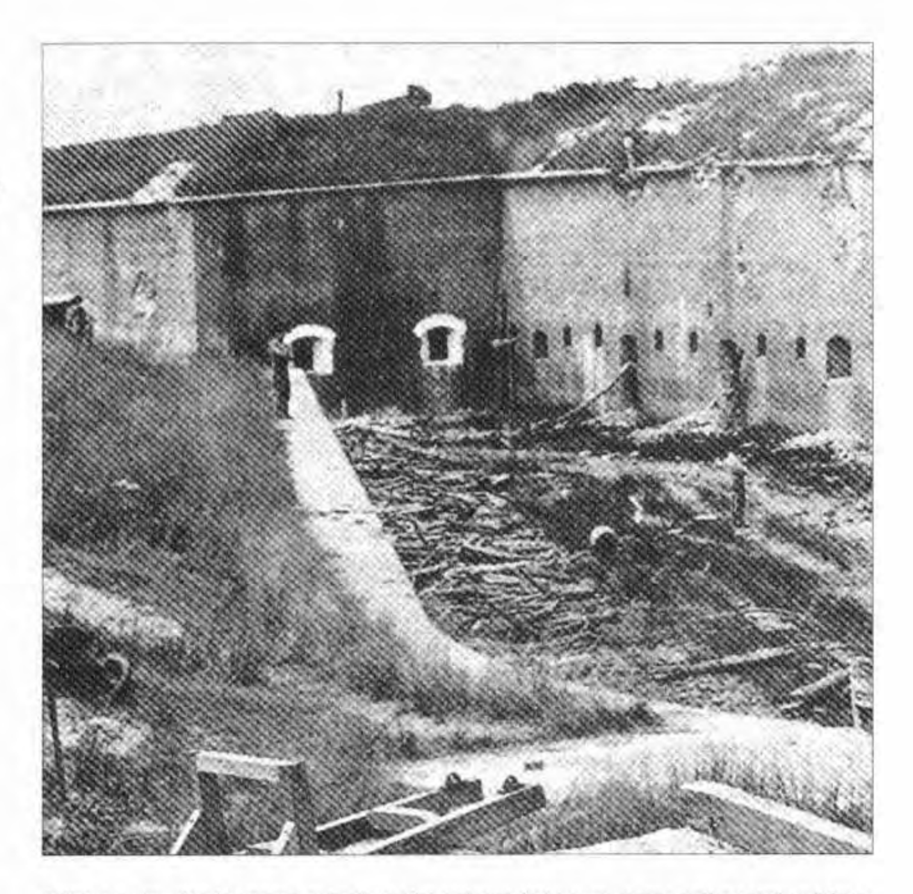
When the Third System forts were being planned, it was clear that the existing stocks of heavy artillery would be inadequate and that specially designed heavy ordnance would be required to equip the fortifications. The first batch of specially designed seacoast artillery guns introduced during the period from 1820 to 1830 consisted of 18-pounders (1816), 24-pounders (1819) and 32-pounders (1829). Designs were heavily influenced by existing French Gribeauval patterns, but the guns were cast from iron with minimal decoration. Gun mountings took the form of solid carriages mounted on a long pivoted lower carriage, a basic system that remained in use (with considerable modification) until after the Civil War. Guns were also mounted on *en barbette* carriages, forming the upper tier of guns on the terreplein. Although little evidence survives of American seacoast carriages of this period, the few sketchy details that are available suggest that the mounting of guns was left to the whim of the officer who installed the ordnance in the fort. By 1831, 42-pounder guns were being placed in coastal fortifications. This ordnance, combined with the tiered system of casemates created by Totten, gave these forts a formidable firepower. The effectiveness of coastal fortifications increased in 1841, when a revolutionary new gun system was introduced.

From 1840 until 1860 the design of American ordnance underwent considerable change, largely through the efforts of three men: George Bomford, Thomas Rodman and John Dahlgren. As Chief of Ordnance, Bomford was responsible for the introduction of seacoast howitzers in 1841, giving coastal fortifications the ability to fire explosive shells at enemy warships. He followed up this success three years later with the columbiad, a versatile gun capable of firing shot or shell with an effective range of almost three miles at a high angle of elevation. Both his 8-inch (64-pounder) and 10-inch (125-pounder) models soon became the weapon of choice in coastal fortifications and columbiads remained in service throughout the Civil War. The Artillery System of 1841 led to the standardization of seacoast artillery and carriages, so that armament should

Wooden casemate carriages pivoted around a metal bar and pin, located immediately beneath the gun embrasure. This reproduction carriage at Fort Pulaski, Georgia shows how the pivot was secured. (Author's Photograph)



The interior of Fort Morgan, Alabama, after the Battle of Mobile Bay (August 1864) and the surrender of the fort to Union forces. Viewed from the covered way on the western face of the fort, the photograph shows how damage appears to have been concentrated on the western terreplein. (Clyde Hensley Collection)



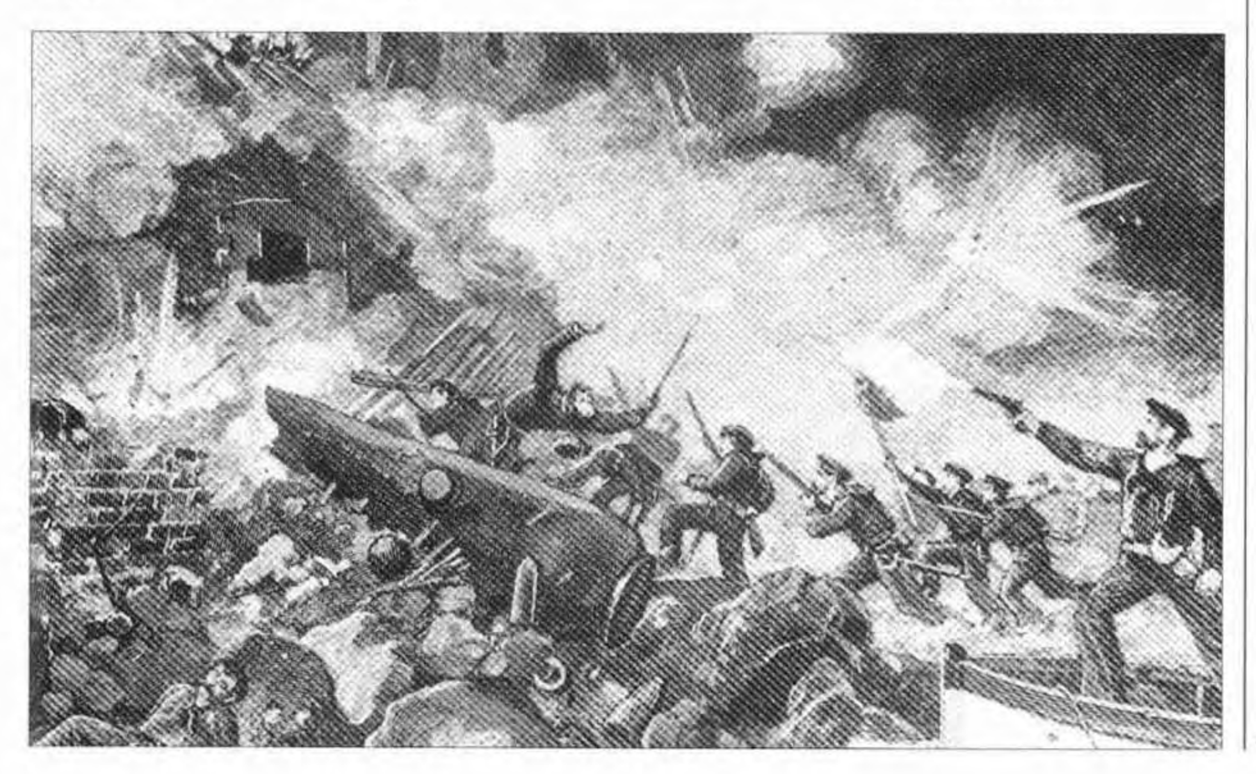
follow a standard pattern whether the columbiad guns were used to defend forts in Maine, Florida or California. Lieutenant Thomas Rodman revolutionized the production of ordnance. Previously, guns were cast from solid iron and were then bored out. He devised a new system, where guns were cast as hollow tubes and the molten metal was cooled by water to harden the metal. This produced strong and reliable barrels, and guns of more than 15- or 20-inch bores. A 15-inch Rodman could fire a 440-pound shot over four miles. John Dahlgren produced guns of his own design for the navy. These pieces, with their distinctive "soda bottle" shape became the most common form of heavy gun in the U.S. Navy, and therefore the main armament of the ships that would batter the Confederate-held forts guarding New Orleans, Charleston and Mobile. Shortly before the outbreak of the Civil War an even more radical form of ordnance was developed. Although rifling had been used to improve the accuracy of small arms for centuries, the first reliable pieces of rifled ordnance were only produced during the 1850s by a trio of British designers (Whitworth, Armstrong and Blakely). During the Civil War, both the Confederate ordnance expert John M. Brooke and the Union designer Robert Parrot developed homegrown rifled guns. A 3.5-inch Blakely rifled gun was used during the bombardment of Fort Sumter in April 1861, and, a year later, Parrot rifles battered Fort Pulaski into submission in a spectacular demonstration of the accuracy and effectiveness of rifled ordnance. Parrott guns were later installed in Union-held coastal fortifications.

These big seacoast guns were mounted on a variety of carriages. Casemate carriages tended to resemble earlier beds, with a sliding upper body and a long sloping lower carriage that could be traversed using wheels set at right angles to the gun, and which ran along a track fitted to the floor of the casemate. Others were mounted on near-circular *barbette* mountings on the terreplein of coastal forts. In the decades preceding the war all seacoast gun carriages were wooden, but, immediately before the war began, metal carriages started to replace them.

While wooden carriages continued to be used in most Southern-held forts, the stronger and less bulky iron carriages were gradually introduced into Union forts.

Operating these guns was problematic given the size and weight of the guns and projectiles, and the limited space available inside a casemate. First, it took four men to carry a shell for an 8-inch columbiad and place it in the muzzle of a gun. More commonly, a system of mechanical shell hoists was used, mounted in the roof of the casemate. These were all muzzle-loading guns, so the sequence of loading and firing was similar to that of most other types of ordnance used during the Civil War, it was just a matter of scale. First the pre-determined powder charge had to be inserted into the barrel, and slid down into place at the seat of the bore. An 8-inch columbiad used a standard charge of 10 pounds of powder, while a 10-inch piece used an 18-pound charge. The projectile was then lifted into place and tamped down the barrel. It made little difference to the loading process if the projectile was solid shot or hollow shell. By contrast, if a heated shot was being loaded, a special cradle was employed to hold the shot (which was limited to the 1841 system 32-pounder and 42-pounder guns). Two men rammed this in place, one standing on either side of the muzzle. The gun captain then stood on the lower slide and pricked the touchhole to puncture the powder bag beneath the vent. He then inserted a copper friction tube and attached a lanyard, which would be pulled to fire the gun. The rest of the crew (usually six to eight men) would roll the gun forward to the front of the lower carriage, so the muzzle pointed through the embrasure. The carriage would then be traversed until it was at the desired bearing and angle of elevation, at which point the gun captain pulled on the lanyard to fire the gun. While a 10-inch columbiad on a wooden casemate carriage could be reloaded in just under two minutes, the process of training and elevating the gun was a laborious and back-breaking procedure, and greatly slowed the rate of fire of the gun. Although difficult and time-consuming to load and aim, these guns were powerful weapons. With the total armament carried on several floors of a coastal fort multiplying its effectiveness, the fire they generated could be devastating.

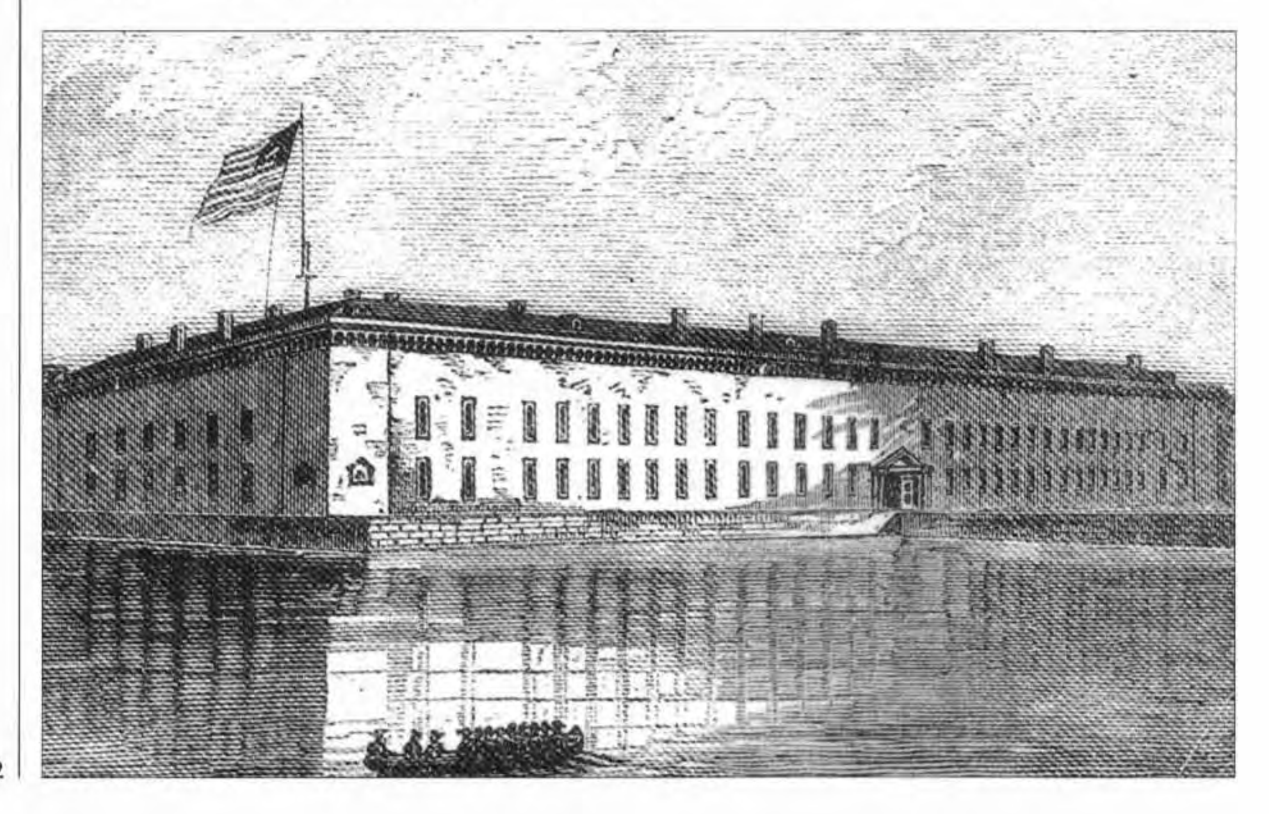
An amphibious attack was launched against Fort Sumter on September 9, 1863; some 400 men in 25 rowing boats tried to sneak up to the fort under cover of darkness, but the alert sentries sighted the boats. The attacking force was driven off after a bitterly-fought 30-minute battle, where the Union assaulting force was pinned down underneath the scarp of the fort. The cost to the Union was 21 men killed and a further 106 taken prisoner. (Stratford Archive)



The forts at war

The fortifications of the Third System played a significant part in the American Civil War (1861–65), from the bombardment of Fort Sumter in April 1861 until the end of the war. When the Confederate states seceded from the Union, many of these forts were held by no more than a caretaker, or at most a small garrison. Apart from Fort Sumter, which was bombarded and captured, four Southern forts remained in Union hands: Fort Monroe in Virginia, Fort Zachary Taylor and Fort Pickens in Florida, and Fort Jefferson off the Florida coast on the Dry Tortugas. Possession of these masonry forts proved crucial to the establishment and maintenance of the Union blockade on the Confederate coast. Fort Monroe was located within range of the Confederate capital at Richmond and served as the launching point for the Union drive up the Peninsula in 1862. Although less strategically important, the Union retention of the other forts gave them secure bases in Florida, which were used by the fleet during the long and grueling naval campaign around the Confederate coastline. Similarly, the Confederate seizure of Fort Sumter, Fort Pulaski and Fort Morgan, plus the two forts guarding New Orleans (Fort Jackson and Fort St. Philip) provided it with the means of protecting its most important harbors. As the war progressed and the Union blockade tightened, the Confederate-held forts became prime targets in the battle for control of the coastline. Fort Macon and Fort Pulaski were besieged and captured during the first year of the war. The passage of the two forts guarding New Orleans led to their surrender and, as a consequence, the Union gained control of the Mississippi River, thus cutting the Confederacy in two. The naval attack on Mobile Bay involved a

Fort Sumter, Charleston Harbor, South Carolina, pictured before the Civil War. The engraving shows the fort from the landward side, which was used to house the offices, stores and officers' quarters. The sally port can be seen in the center of the landward scarp, with the fort's jetty extending outwards from it. (Clyde Hensley Collection)



daring passage of Forts Morgan and Gaines, prompting a brief but spectacular engagement that led to the fall of the last Confederate port on the Gulf Coast.

To best demonstrate the effectiveness of these brick-built forts in action, we need to survey their performance. Fortunately, accounts by fortress commanders, naval officers and siege artillery officers are relatively prolific, allowing for a detailed examination of the performance of several forts.

Fort Sumter, 1861

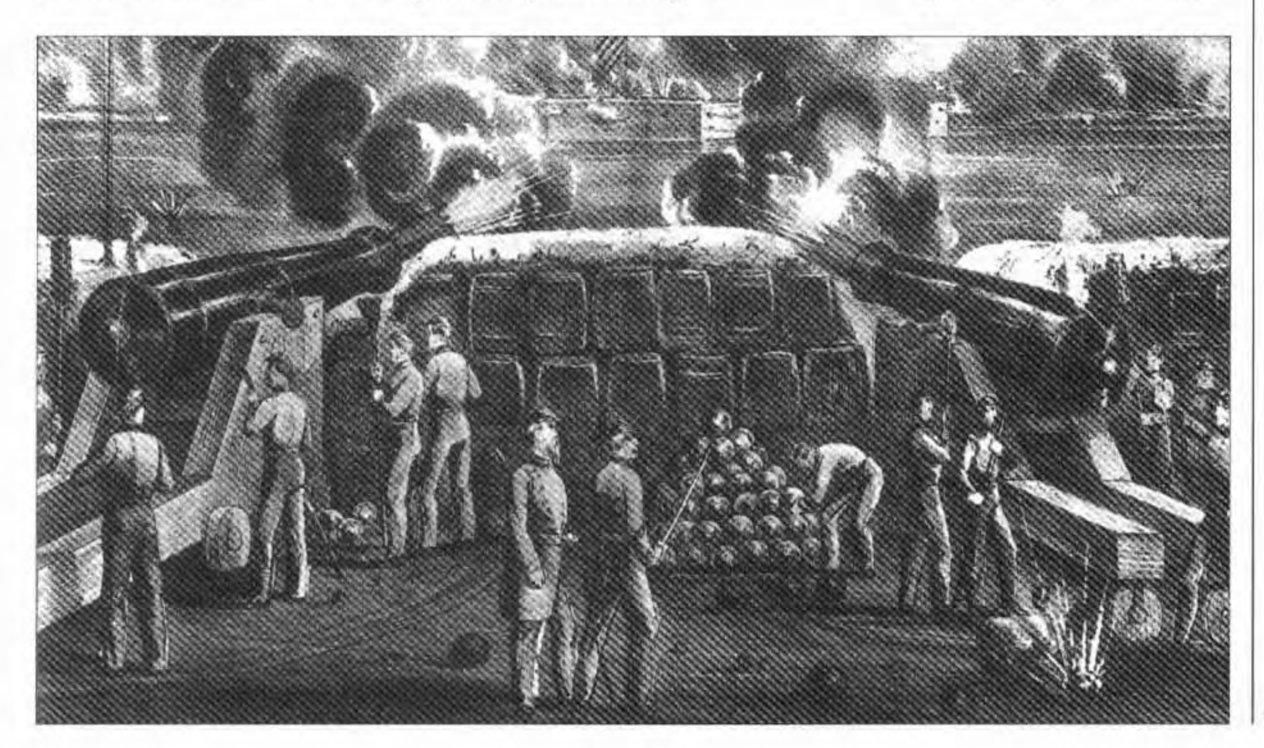
During the months leading up to the outbreak of the Civil War, the Union garrisons of Fort Moultrie and Fort Sumter found themselves isolated by a hostile population. Both forts were ill prepared for service, particularly Fort Moultrie, which was largely indefensible due to cracks in the walls and sand piled up in front of the embrasures. For this reason the two garrisons concentrated their forces in Fort Sumter in late December 1860. For the next 13 weeks, they worked to improve the defenses of the Fort, which had been left in the hands of a solitary caretaker for years. When secessionist troops garrisoned Fort Moultrie and built new batteries facing Fort Sumter, it became a matter of time before someone fired a shot. Finally, at dawn on April 12, 1861, the first shot was fired from a mortar in Fort Johnston, a battery erected just over a mile to the west of Fort Sumter on James Island. The Civil War had begun.

Captain Abner Doubleday recalled the effectiveness of the Confederate fire.

> In a moment the firing burst forth in one continuous roar, and large patches of both the exterior and interior masonry began to crumble and fall in all directions ... Nineteen batteries were now hammering us, and the balls and shells from the 10-inch columbiads, accompanied by shells from the 13-inch mortars which constantly bombarded us, made us feel as if the war had commenced in earnest.

The garrison fought back, despite having no breech sites for their guns, but was driven from the terreplein by mortar fire during the first day of the bombardment. The mortar fire was particularly disconcerting, as:

The bombardment of Fort Sumter in April 1861, seen from the Confederate positions at Cummings Point. The first shots of the Civil War were probably fired from this position, shortly after 4.30am on April 12, 1861. (Stratford Archive)





The interior of Fort Sumter photographed in September 1863. The hot-shot furnace appears undamaged, but the northeastern casemate wall and the casemate wall above it have suffered extensive damage. (Clyde Hensley Collection)

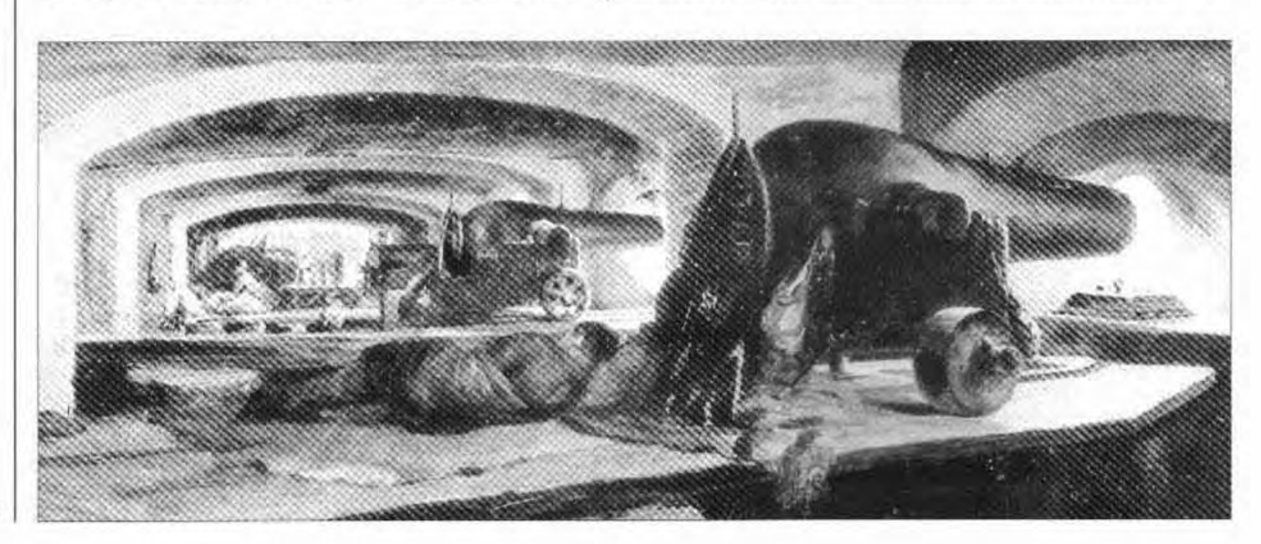
> after sailing high in the air, [they] came down in a vertical direction, and buried themselves in the parade-ground, [and] their explosion shook the fort like an earthquake.

Worse was to come. As Doubleday recalled:

> Our fort had been built with reference to the penetration of shot when the old system of smoothbore guns prevailed. The balls from the new Blakely gun on Cummings Point, however, had force enough to go entirely through the wall which sheltered us, and some of the fragments of brick which were knocked out wounded several of my detachment.

Towards the end of the first day of the bombardment, mortar shells set the Officers' Quarters alight, but after the fires were extinguished, there was no more serious damage to the fort before darkness ended the bombardment. The

Fort Sumter, December 8, 1863. Painting by Conrad Wise Chapman. The large Rodman pieces are recognizable by their "soda bottle" appearance. Note how the artillery crews are shown sleeping beside their guns. (Museum of the Confederacy, Richmond, Virginia – courtesy Clyde Hensley Collection)



following day the firing resumed at 4am, and continued for the rest of the day, save for an hour in the morning when a rain squall brought a lull in the firing. This time incendiary shells were fired into the fort from Fort Moultrie, hitting the Officers' Quarters.



The bombardment of Fort Sumter, April 1861. While explosions are shown ripping apart the barrack blocks, smoke can be seen pouring from the embrasures in the casemates. Defenders claimed that the smoke from the burning buildings was particularly debilitating. (Stratford Archive)

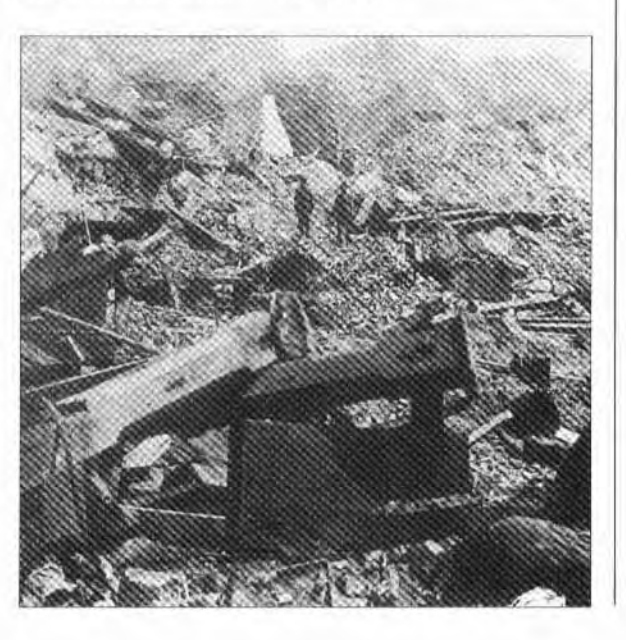
> The fire was put out, but at 10am a mortar shell passed through the roof, and lodged in the flooring of the second story, where it burst, and started the flames afresh. This, too, was extinguished, but the hot shot soon followed each other so rapidly that it was impossible for us to contend with them any longer. It became evident that the entire block, being built with wooden partitions, floors and roofing must be consumed, and that the magazine, containing three hundred barrels of powder would be endangered, for even after closing the metallic door, sparks might penetrate through the ventilator.

The fort was not designed to fend off this kind of attack. While the garrison labored to contain the fires and save the powder, smoke filled the casemates, making it almost impossible to breathe. All this time, shot smashed into the casemates. "When at last nothing was left of the building but the blackened walls and smoldering embers, it became painfully evident that an immense amount of damage had been done." The interior of the fort and the barrack block on its landward side lay in ruins. Shortly afterwards, negotiations began under a flag of truce and the garrison surrendered. During the two-day bombardment, the fort was subjected to a range of shot from almost every side, but the really damaging rounds came from mortars and the single rifled gun. Both were weapons that the Bernard Board had never imagined would ever be used against one of their coastal fortifications. The rules of fortification were being rewritten.

Fort Macon

As part of the campaign fought for control of the coastal waters of North Carolina during early 1862, a Union force laid siege to Fort Macon. The fort was built to protect Beaufort, North Carolina's only significant deep-water port. Designed by Simon Bernard, construction began in 1826 and continued until late 1834. Totten also incorporated improvements to its design in the early 1840s. Garrisoned by an ordnance sergeant caretaker since 1849, it was seized by the North Carolina militia when the state seceded.

By 1862 the small fort was garrisoned by 500 men under the command of Colonel Moses White (although only 300 were fit for duty). Designed in the shape of a pentagon the single-tiered casemate fort contained 67 guns mounted *en barbette*. General Ambrose Burnside decided to capture the position in March 1862, and spent several days cutting the fort off from the rest of the state by establishing outposts in the Carolina hinterland. While a small blockading squadron sealed it off from relief by sea, a battery of three 30-pounder Parrott rifled guns was sited just out of range of the Fort's guns, supported by two batteries



The interior of Fort Sumter photographed in December 1863. The two men in the photograph are standing on the site of the hot-shot furnace. (Clyde Hensley Collection)



The interior of Fort Sumter in September 1863, from a painting by John R. Key. Based on a contemporary photograph by George S. Cook, both photographer and artist captured the moment when a Union shell hit the northeastern face of the casemate. (Confederate Museum, Charleston, S.C. / Photo from the Clyde Hensley Collection)

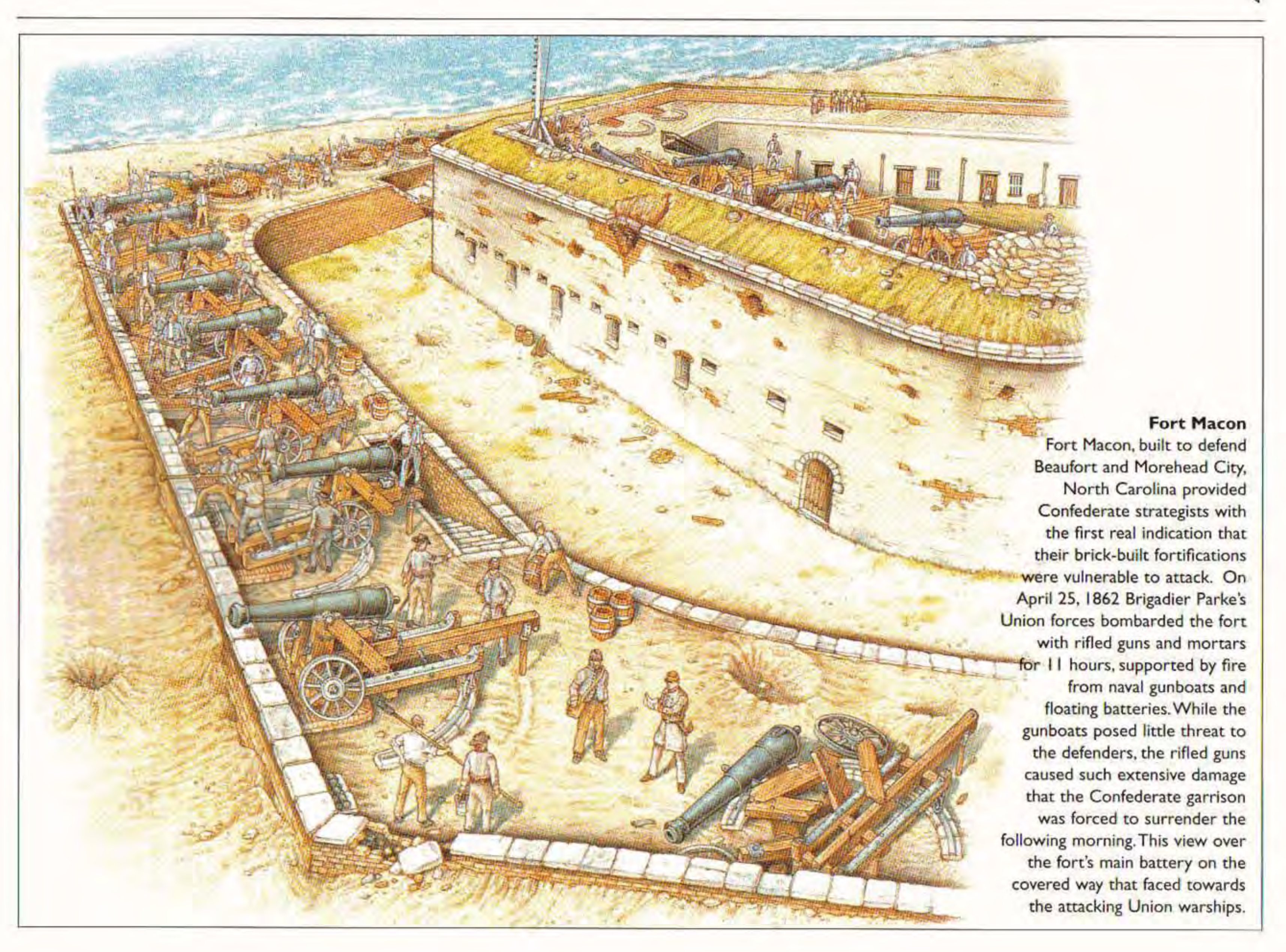
of heavy siege mortars (8-inch and 10-inch pieces). These were the weapons that had proved so effective at Fort Sumter. The bombardment began early in the morning of March 25, and continued until nightfall. By the end of the long day, hundreds of mortar shells had been dropped inside the fort itself, in its moat or on the pentagonal terreplein. Breaches were blown in the wall by the rifled guns, and 17 of the fort's guns were disabled by direct fire against the embrasures. It became too dangerous for the Confederate gunners to remain at their posts, and consequently they were unable to respond to the devastating one-sided bombardment. The following morning the garrison surrendered. Despite the intensity of the bombardment, Confederate losses were limited to 9 killed and 25 wounded. A naval officer recorded that:

> Our guns were well managed, but being able to do little damage to water batteries and siege guns, firing through very narrow embrasures. The damage was clearly done by the mortars and rifled guns. Colonel White reported; The enemy kept up a very vigorous and accurate fire from both rifles and mortar, dismounting guns, disabling men and tearing the parade, parapet and walls of the fort.

Once again, rifled guns had proved their worth. When their employment was combined with a bombardment by mortars, the defenses literally crumbled.

Fort Pulaski

Built on Cockspur Island to guard the mouth of the Savannah River, Fort Pulaski was regarded as one of the strongest forts in the country. It was built over a period of 18 years on a bed of log pilings and wooden beams, a project supervised at one stage by the future Confederate general Robert E. Lee. Completed in 1847, the pentagonal structure was formed from one tier of casemates and a *barbette* level on four sides (the front two faces and the truncated sides), and a landward face that contained the fort's buildings, protected by two small bastions, and a series of outer works covering the gorge. The fort itself was ringed by a wet moat, while the surrounding swampy island was considered an obstacle to any attacking force. Brigadier-General Totten was impressed, boasting that "you might as well bombard the Rocky Mountains." He added that "the work could not be reduced in a month's firing with any number of guns of manageable calibers." His optimism would soon prove to be misplaced. Equally optimistic was Colonel Charles H. Olmstead, the fort's Confederate commander. Although only 48 guns were in place out of the 140 guns the fort was designed to house, his garrison of 385 men was well prepared to withstand any assault. Even Robert E. Lee supported this optimism, saying



Fort Macon

Fort Macon, built to defend Beaufort and Morehead City, North Carolina provided Confederate strategists with the first real indication that their brick-built fortifications were vulnerable to attack. On April 25, 1862 Brigadier Parke's Union forces bombarded the fort with rifled guns and mortars for 11 hours, supported by fire from naval gunboats and floating batteries. While the gunboats posed little threat to the defenders, the rifled guns caused such extensive damage that the Confederate garrison was forced to surrender the following morning. This view over the fort's main battery on the covered way that faced towards the attacking Union warships.

"Colonel, they will make it pretty warm for you here with shells, but they cannot breach your walls at that distance."

During late March, Federal troops landed on nearby Tybee Island and hidden batteries of heavy mortars and rifled guns were brought up to within range of the fort. Captain Quincy A. Gilmore was a staunch advocate of rifled ordnance, and together with 12 13-inch mortars and nine 8-inch and 10-inch columbiads, he commanded a battery of five 30-pounder Parrott rifles, the same guns that had caused such devastation at Fort Macon the month before. Four James Rifles, converted from older smoothbore guns, supported them.

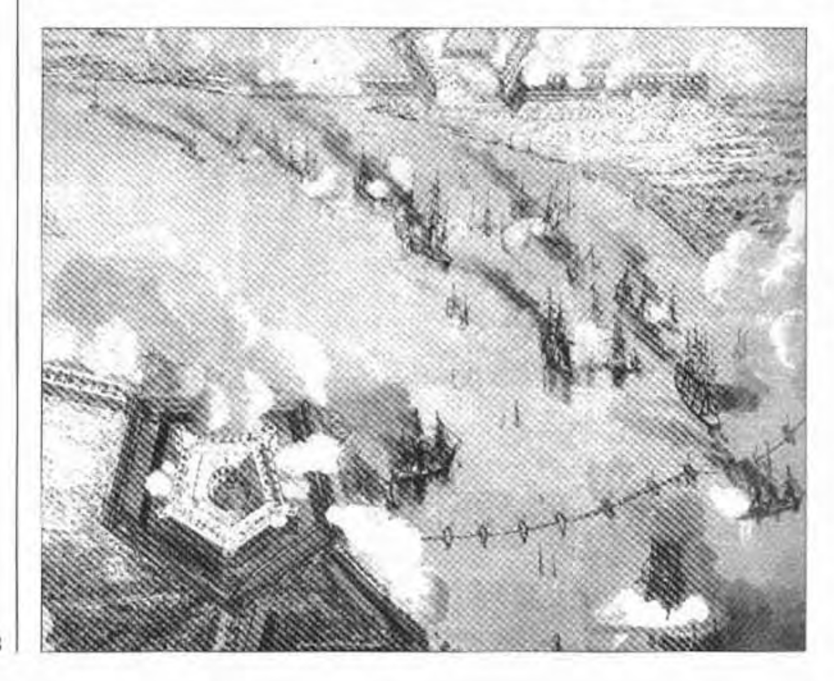
Shortly after dawn on April 9, 1862, the bombardment began. With 12 mortars, a rate of fire of one mortar shell per minute was maintained for almost 30 hours. While the Confederate gunners returned this fire, the mortars and rifled guns were out of range. Soon it became apparent that the rifled shells were causing significant damage to the seaward face of the Fort.

After nine hours of bombardment, a breach had been smashed in the south-eastern seaward face of Pulaski. Corporal Law, a Confederate soldier inside the fort later recalled that:

> At the close of the fight all the parapet guns were dismounted except three ... Every casemate gun in the south-east section of the fort, from No. 7 to No. 13 were dismounted, and the casemate wall breached, in almost every instance, from the top of the arch, and say between five or six feet in width. The moat was so filled with brick and mortar that one could have passed over it dry-shod. The Officers' Quarters were torn to pieces, the bombproof timbers scattered in every direction over the yard, and the gates to the entrance knocked off. The parapet walls on the Tybee side were all gone, in many cases down to the level of the earth on the casemates. The protection to the magazine in the northwest angle of the fort had all been shot away; the entire top corner of the magazine next to the passageway was shot off, and the powder exposed, while three shots had actually penetrated the chamber.

It was this risk to the magazine that forced Colonel Olmstead to surrender his command in the afternoon of April 12. Although the heavy mortars had caused much of the damage to the fort, the real destruction was due to the penetrating bullet-like rifled projectiles fired from the 30-pounder Parrots. This was an incredible demonstration of the superiority of rifled ordnance over traditional masonry fortifications. In effect, on April 12, 1862, all of the Third System coastal forts in the United States were rendered obsolete. As the Union General David Hunter put it:

> The result of this bombardment must cause ... a change in the construction of fortifications as radical as that foreshadowed in naval architecture by the conflict between the Monitor and the Merimac [*sic*]. No works of stone or brick can resist the impact of rifled artillery of heavy caliber.



The Battle of New Orleans (April 1862), viewed from the western bank of the Mississippi River. In this largely inaccurate engraving, the Union fleet is shown passing between Fort Jackson in the foreground, and Fort St. Philip in the background. (Stratford Archive)

Fort Jackson

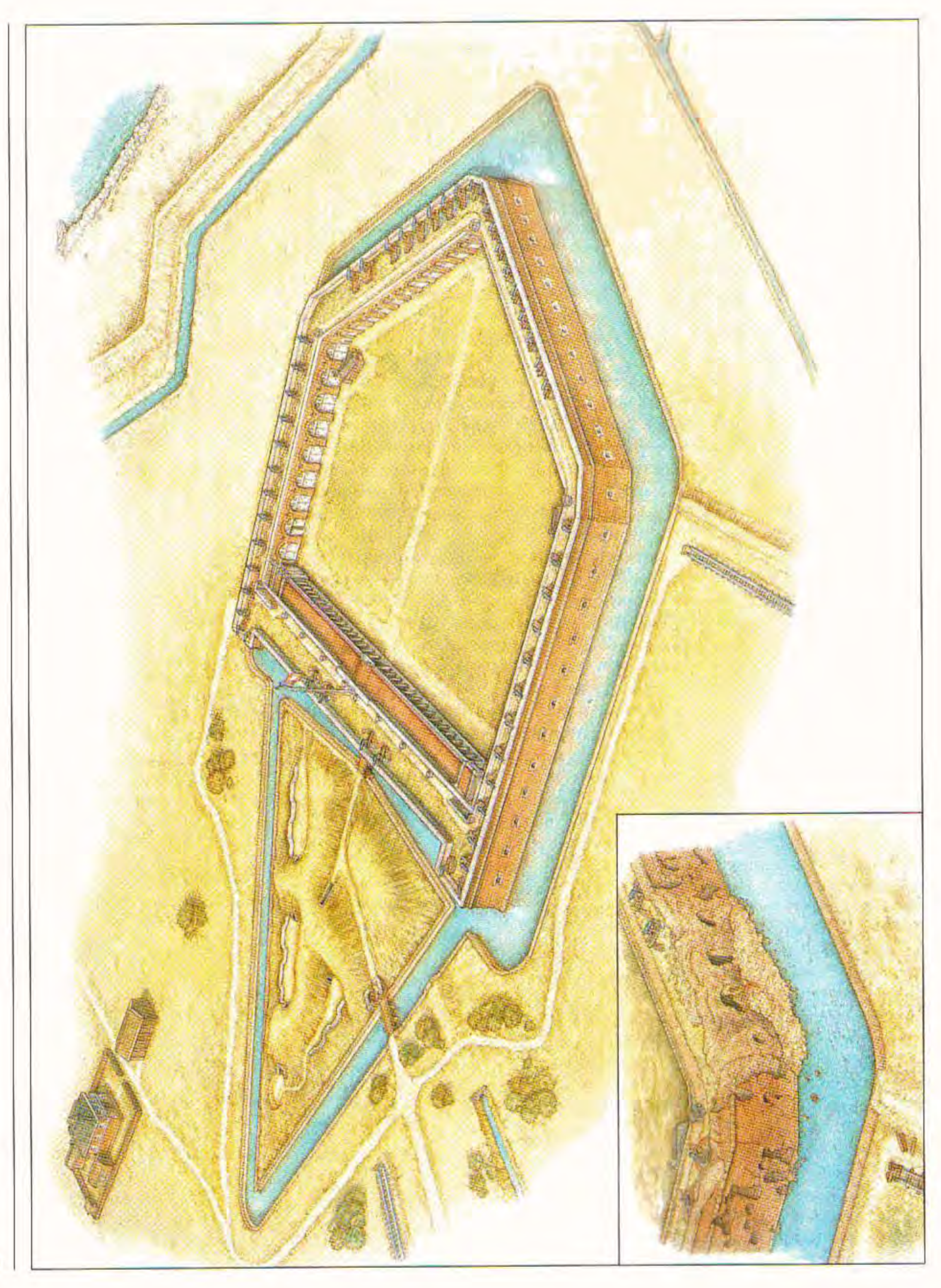
The spring of 1862 was a traumatic period for the Confederate garrisons of Third System forts. Within a matter of weeks, Fort Macon and Fort Pulaski had fallen following short devastating bombardments by mortars and rifled guns. Just over a week after the surrender of Fort Pulaski, it was the turn of the two forts that guarded the Mississippi River south of New Orleans.

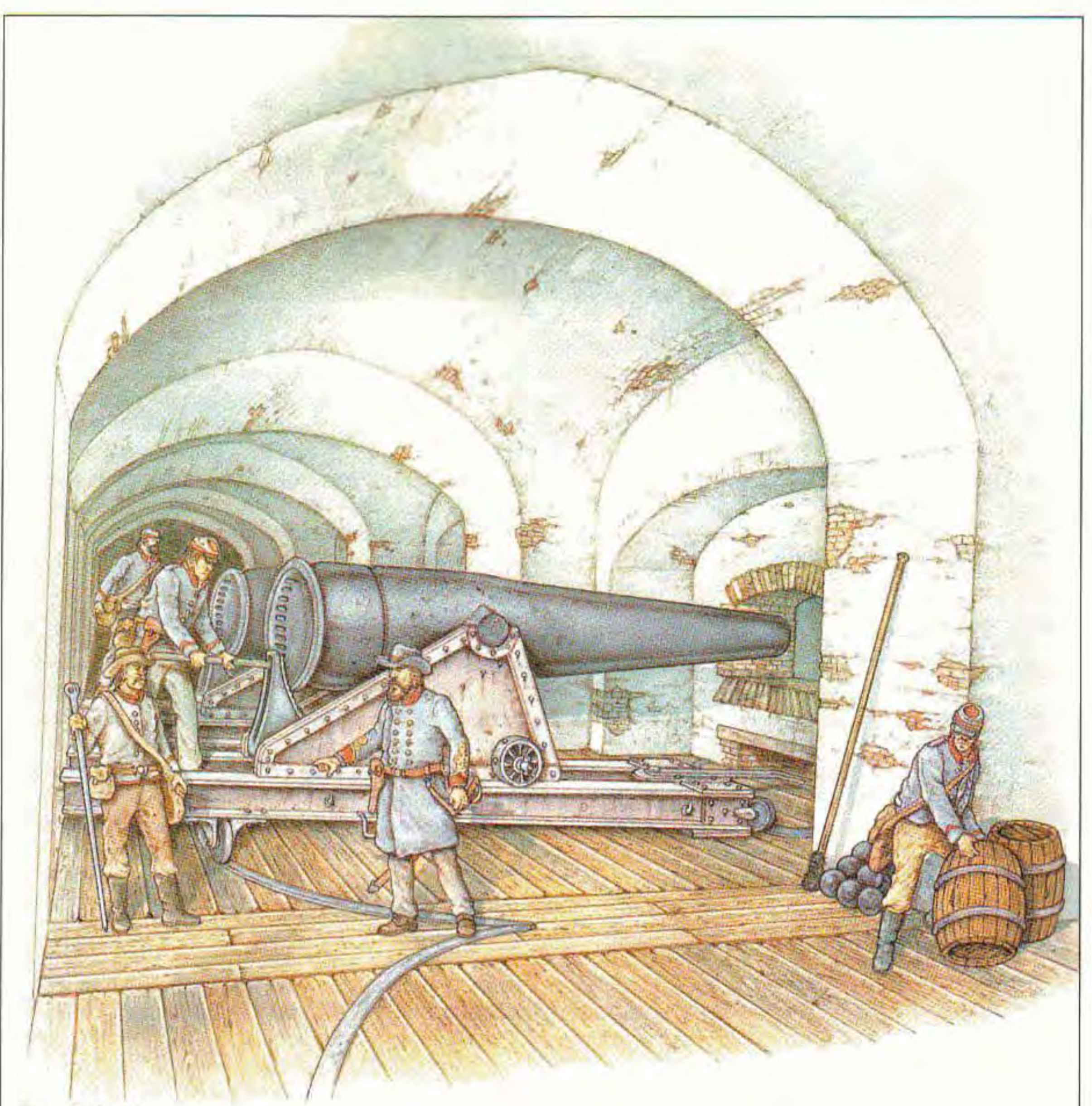
Since the start of the war, the naval strategy of the Union had concentrated on the imposition of a blockade around the Confederate coastline, part of the "Anaconda Plan" devised by General Winfield Scott. The second portion of this plan involved cutting the Confederacy in two by seizing control of the Mississippi. In January 1862, Captain David Farragut was given command of the Union fleet in the western part of the Gulf of Mexico and ordered to "reduce the defenses which guard the approaches to New Orleans." After that, his fleet was supposed to capture the thriving port. His attack was launched on April 17, 1862, when a flotilla of mortar boats began a bombardment of Fort St Philip and Fort Jackson. A line of obstacles spanned the river immediately below Fort Jackson, and the defenses were further augmented by a small flotilla of warships, including the small ironclad ram CSS *Manassas* and the incomplete casemate ironclad *Louisiana*.

The line of obstacles was breached on the night of April 20–21, and at 2am on the morning of April 24, Farragut led his fleet upriver in an attempt to force their way past the two forts. Although there is insufficient space to provide a detailed description of the battle, a brief outline is appropriate. Fire from the forts damaged several ships, but failed to stop the progress of the Union fleet. Similarly the Confederate squadron was decimated in a close-range fight. Farragut's ships managed to steam upstream, out of range of the guns in the two forts. General Benjamin Butler captured New Orleans at the head of 4,000 men, who then marched south to invest Fort Jackson and Fort St. Philip. The garrisons mutinied on April 29, and the forts surrendered to the Union.

In April 1862, Fort Jackson was an imposing structure. Work began on the star-shaped Third System fort in 1832 and construction dragged on for over two decades, as the swampy conditions of the Mississippi Delta posed considerable problems to the engineers. Designed by Simon Bernard, the fort was built on classical Vauban principles. A large bastion anchored each face of the fort, and the whole structure was surrounded by a moat. A tier of casemates formed a pentagon enclosing a central parade. In the center of this area a circular citadel provided space for barrack rooms, officers' quarters and stores, and provided a final line of defense. A water-filled moat separated the inner and outer works of the fort, and these extensive lines of revetments, covered ways and salients were further protected by a less carefully structured ditch, filled by the floodwaters of the Mississippi. The swampy terrain surrounding the fort made a land attack against it unlikely, but in any case the obstacles placed in the way of any attacker by the engineers were sufficient to daunt all but the most reckless Union commander. A water battery, built in 1858, provided additional firepower on the downstream side of the fort, while to the north across the Mississippi River lay Fort St. Philip. This was a far older fortification, built by the French in 1761, and then improved by the Spanish. During the War of 1812 the defenses were strengthened, and extensive rebuilding work in 1841–43 had further improved it. The real strength of Fort St. Philip was its location in a patch of swamp that flooded regularly. Although this made the fort's outer works untenable, the quagmire also made the fort virtually invulnerable to every kind of attack save an amphibious one.

Brigadier-General Joseph K. Duncan, who commanded the two fortifications, had his headquarters in Fort Jackson. While Fort St. Philip was armed with 52 guns, Fort Jackson was protected by 74 pieces, including columbiads, 32-pounders of the 1821 pattern and an assortment of other pieces. Around 120 men garrisoned it. The mortar bombardment had caused significant damage to the interior of the fort, damaging and burning the citadel, smashing the hot-shot





Fort Pulaski

Fort Pulaski, built on the marshy Cockspur Island, Georgia was designed to protect the port of Savannah. The Third System coastal fortification was deemed to be invincible, but advances in ordnance meant that her brick-built structure was vulnerable to accurate long-range fire from rifled guns. On February 19, 1862, Brig-Gen Thomas W. Sherman laid siege to Fort Pulaski, while U.S. Army engineer Captain Quincy A. Gilmore built gun emplacements to the south east of Pulaski from which he could bombard its walls. On April 10 the bombardment began, after the garrison commander had been called upon to surrender. Within hours, Gillmore's rifled guns had breached the south-east scarp of the fort, while mortar shells rained down on the fort's interior. As the outer walls fell away, the rifled shells began penetrating further into the fort, and threatened to hit the magazine. The garrison (opposite) had little choice but to surrender in the afternoon of April 11. This plate shows the area where the damage to the fort was concentrated. Note the earthen outer works beyond the gorge wall on the rear face of the fort.

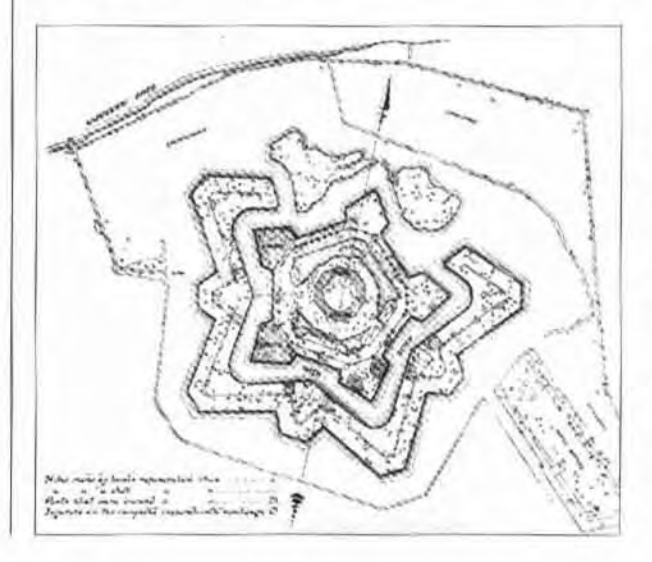


Fort Jackson, Louisiana, viewed from the levee on the banks of the Mississippi River after the Civil War. Although the ground hides the outer works and moat, the damage inflicted to the ramparts of the northern bastion (center) and the northwestern scarp and bastion (right) are still clearly visible. As this was the face that was the greatest threat to the Union fleet, this was the point of concentration of Union fire. (Stratford Archive)

furnace, the water cistern, the sally port and the base of the casemates facing the river. This led to the partial flooding of the casemates when the Union gunsbreached the dikes around the fort and flooded it with river water. Cracks were evident in the brickwork of the casemates, and damage was also inflicted on the water battery. Fortunately for the garrison, casualties had been minimal. This left the defenders in poor shape to face the onslaught of the Union fleet, and goes some way to explain their inability to cause significant damage to the wooden-hulled warships. The loss of the shot furnace was particularly unfortunate, as heated roundshot could have cost Farragut a significant portion of his fleet. Colonel Higgins, a senior officer in the garrison later wrote:

> Nearly every [mortar] shell of the many thousand fired at the fort lodged inside of the works. On the first night of the attack, the citadel and all buildings in rear of the fort were fired by bursting shell, and also the sandbag walls that had been thrown up around the magazine doors. The fire ... raged with great fury, and no effort of ours could subdue it. At this time, and nearly all this night, Fort Jackson was helpless; its magazines were inaccessible, and we could have offered no resistance to a passing fleet. The next morning a terrible scene of destruction presented itself. The wood-work of the citadel being all destroyed, and the crumbling walls being knocked about the fort by the bursting shells, made matters still worse for the garrison. The work of destruction, from now [April 17] until the morning of the 24th when the fleet passed, was incessant. I was obliged to confine the men most rigorously to the casemates, or we should have lost the best part of the garrison ... The parapets and interior of the fort were completely honeycombed, and the large number of sandbags with which we were supplied alone saved us from being blown to pieces a hundred times, our magazine doors being much exposed.

Fort Jackson, Louisiana, was subjected to a week-long mortar bombardment, from April 18 to 24, 1862. This plan shows the fall of shot, with extensive damage inflicted to the water battery, the outer works, the terreplein and the inner citadel. After such a heavy bombardment it is surprising that the fort was able to reply to the fire of the Union fleet when it passed by the fort on the morning of April 24. (Stratford Archive)



When the Union fleet drew level with the fort early in the morning of April 24, the garrison returned the fire of the warships as best they could. Mortar fire continued to play on Fort Jackson and the water battery during the attack. Of the eight guns in the exposed water battery (two rifled 32-pounders, two columbiads, three 32-pounders and a mortar), only the smoothbore guns remained in operation by the time the fleet attacked. Captain Robertson opened fire, and "the water battery thundered its greeting at the enemy." Moments later the guns of Fort Jackson joined in the fight, and the Union fleet exchanged broadsides with both positions. An observer recalled that "The flashes of the guns from both sides lit up the river with a lurid light that revealed the outlines of the Federal steamers more distinctly."

The engagement continued for an hour, by which time the fleet had passed out of range. Despite later claims by Union naval commanders, none of the guns in either the water battery or Fort Jackson were damaged during the passage of the fleet, and the crews manning both positions stayed at their posts despite the intensity of the fire.

Although heavily damaged by the mortar bombardment, the Confederate garrison of Fort Jackson did the best they could with the few undamaged guns they had available to them. Given that the armament of the fleet included 24 rifled guns (ranging in size from 20-pounders to the huge 100-pounder pivot gun mounted in the USS *Pensacola*), over four times the number of rifles that had subdued Forts Macon and Pulaski, the garrison were fortunate not to suffer greater casualties and damage. What saved both ships and fort was the fact that the battle was fought at night, and accurate sighting was extremely difficult.



Fort Monroe, Virginia, viewed from the south west after the Civil War. Additional buildings were built on the site after the conflict, as the fortification was deemed obsolete for all purposes other than to serve as a military barracks. (Stratford Archive)

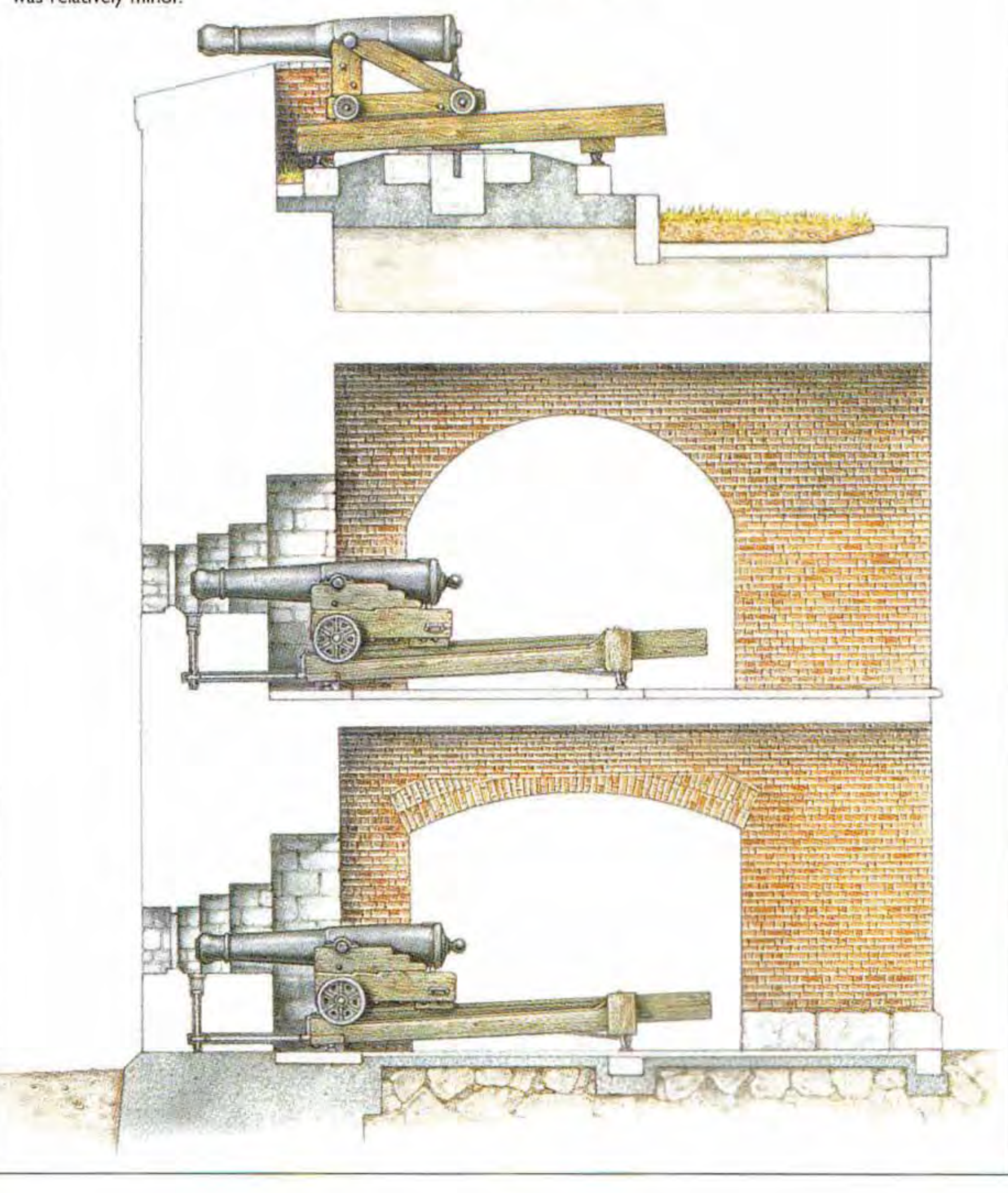
In all these actions, the imposing Third System forts failed to do the job they were supposed to. Forts Sumter, Macon and Pulaski fell when they were attacked with a combination of rifled ordnance and mortars. The Mississippi River forts failed to prevent the passage of an enemy fleet, the very task they had been constructed to perform. During the Battle of Mobile Bay in August 1864, the inability of Fort Morgan to cause significant damage to Farragut's Union fleet was almost a re-run of the Battle of New Orleans. In that case, the lack of effectiveness was exacerbated by the deterioration of powder in the magazine, but the effect was the same. Another Third System fort failed to stop the passage of a fleet and proved itself unable to defend the harbor it was built to protect. Only one masonry-built fort emerged from the war with a reputation for effective defense. Once Fort Sumter was integrated into the Confederate defenses of Charleston Harbor, it anchored the defenses of the city. Despite being reduced to a mound of rubble, Fort Sumter remained in Confederate hands until the city was abandoned due to the approach of General Sherman's army. While it can be argued that the very destruction of the fort improved its defensive abilities, turning it into an earth-built fortification through incessant bombardment, the real heroes of Fort Sumter were the gunners who continued to man their post during months of attack. In April 1863 they achieved the only real success of a Third System fort during the war, by driving off Admiral Du Pont's squadron of ironclad warships when the U.S. Navy launched a spirited attack on the fort. Concentrated fire from the casemates sank one ironclad (the USS *Keokuk*), and battered the rest of the fleet so badly they were forced to retire. While an isolated incident in the otherwise disappointing performance of Totten's fortifications, the engagement did serve to underline the effectiveness of rifled ordnance. After the experiences of Fort Marion and Fort Pulaski, the garrison of Fort Sumter was reequipped with a handful of new rifled guns designed by John M. Brooke. They demonstrated that although brick-built fortifications were vulnerable to modern artillery, Totten's notion that a properly armed fort was capable of driving off an enemy fleet was valid. Given the right guns, the Confederate defenses of Louisiana, North Carolina and Georgia might have fared better than they did.

The interior of the lower casemates and gorge face of Fort Sumter was used as bombproof barrack rooms, offices and quarters for the garrison. In this engraving, Captain Thomas A. Huguenin of the Confederate garrison is shown seated in the makeshift Commander's Headquarters Office. (Stratford Archive)



Fort Morgan

Fort Morgan was built to protect Mobile Bay, Alabama, and its design followed a well-tested pattern. Extensive outer works and a dry moat protected the bastioned casemate fort, while the high casemate and terreplein system protected the parade behind the inner works. In addition, a string of small coastal batteries provided additional protection for the fort on its seaward side. During the Union passage into Mobile Bay in August 1864, Fort Morgan came under fire from a powerful squadron of enemy warships, but the damage inflicted on the well-built fortification was relatively minor.

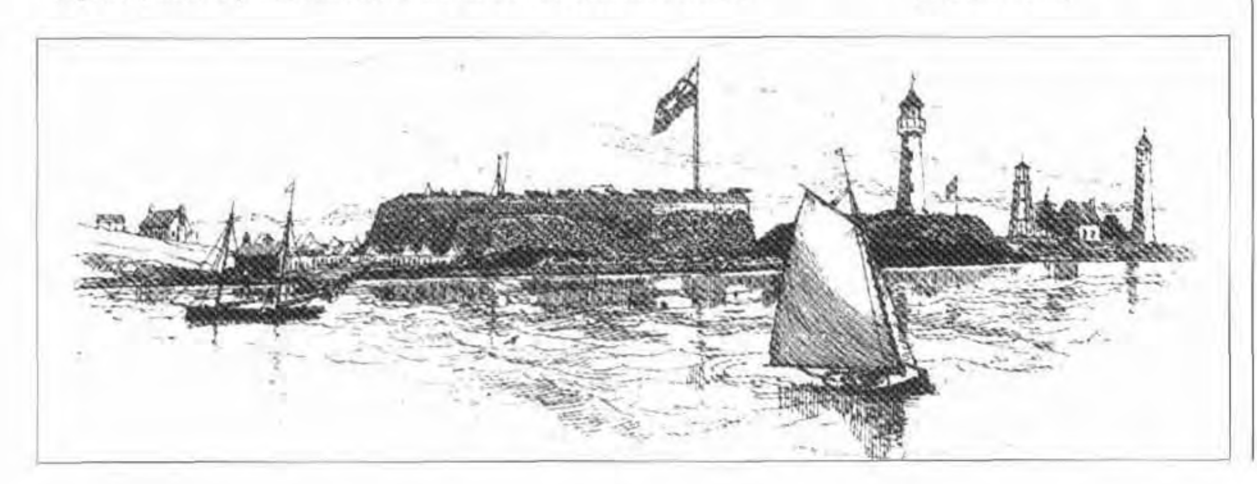


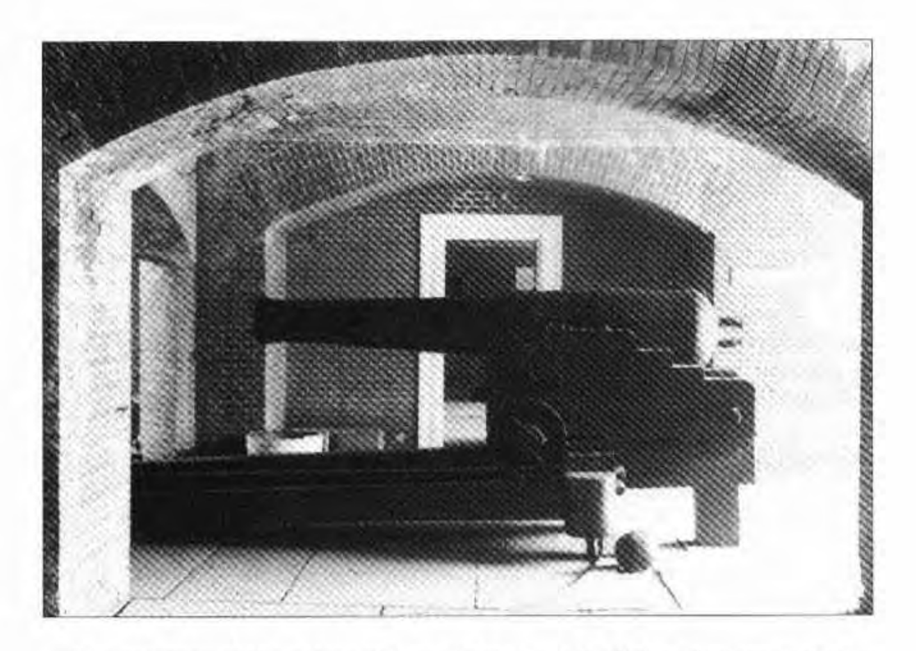
Aftermath of the Civil War

When the Civil War began, engineers of the Confederate Army realized that while they now controlled most of the Third System coastal fortifications in the Southern States, there were significant gaps in the system. Many smaller harbors lacked any kind of modern fortification, and weaknesses were apparent in existing well-defended regions. After all, this was a war unlike any that the military planners and engineers had been planning for. Consequently additional fortifications were constructed around the southern coasts. There was no time available for the building of imposing brick-built forts of the kind designed by Bernard and Totten. Instead, these were earthworks, where mounds of sand or soil were sculpted into gun batteries, and reinforced by wooden revetments. The largest were built complete with parapet, rampart, ditch, covered way and glacis. These could be constructed rapidly, and for a minimal coast compared to the Third System positions, but they were also considered more vulnerable, and required better protection against infantry assault. Perhaps the best-known fortification of this type is Fort Fisher, North Carolina, built to protect the entrance to Wilmington and the Cape Fear River in North Carolina. Fort Wagner, South Carolina, is also particularly well known for being the target of an assault by the 54th Massachusetts (colored) Regiment in July 1863. The works were abandoned two months later when the Confederates withdrew their garrison to a less exposed position. Sometimes, as was the case with Fort Wagner, these works were constructed to supplement the defensive power of a masonry fort, but others, like Fort Fisher were stand-alone fortifications. Experience gained during the war showed that where coastal fortifications were constructed from soft earth or sand, such as was the case at Fort Fisher, bombardments proved less effective than against conventionally built masonry forts, as the force of shells were dissipated.

Following the end of the Civil War, work continued on a number of Third Syste fortifications that still remained unfinished, but funding for the project was withdrawn in 1867. This date therefore marks the end-point of the Third System of coastal fortification, an era that had spanned exactly half a century. The dramatic demonstrations of the effectiveness of rifled ordnance, and even large modern smoothbore guns, over masonry forts during the Civil War proved too much of an obstacle for engineers to overcome. To politicians and the public, masonry-built coastal fortification had become obsolete.

Fort Morgan, Mobile Bay, Alabama, sketched before the Union attack on Mobile Bay in August 1864. The lighthouse on the southern side of the fort's outer works was heavily damaged during the battle. (Stratford Archive)



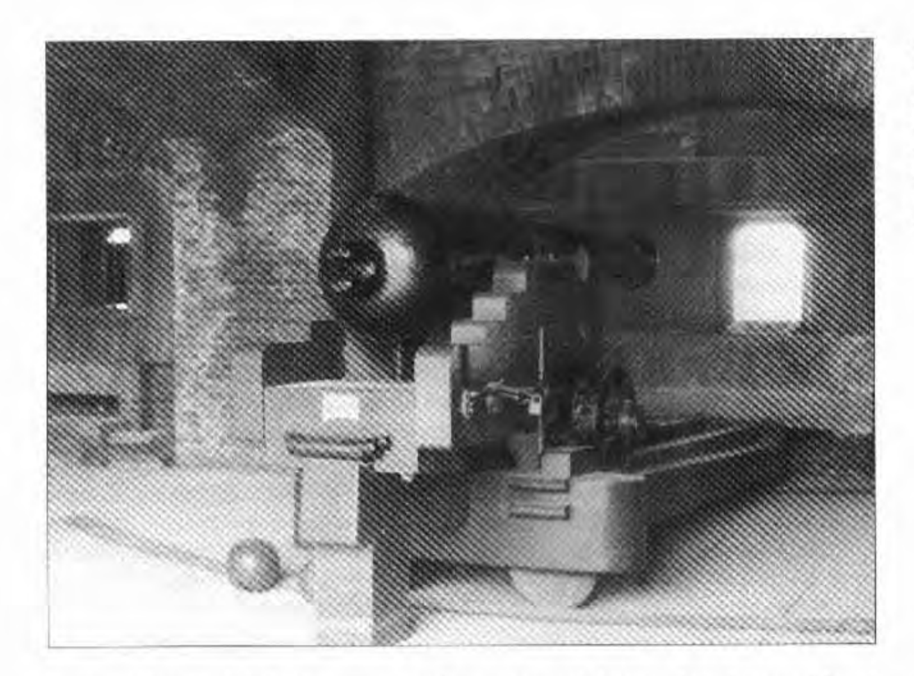


A 32-pounder columbiad on a reproduction of an early form of casemate carriage. This piece at Fort Delaware, Delaware City, is typical of the less powerful guns deployed in coastal fortifications before the outbreak of the Civil War.

The coastline of the nation still needed to be defended, and while engineers experimented with brick-revetted earthen fortifications, the army favored the deployment of submarine mines (known as "torpedoes") and defensive mortar emplacements. Many of these new works were never fully completed or armed, while the majority of the Third System fortifications fell into disuse after being "mothballed" by the U.S. Army in the early 1880s. Further developments in ordnance, such as the introduction of breech-loading artillery and the increase of range, also undermined any attempt to institute an expensive program of fortification building that could be overtaken by the speed of technological development.

This abandonment of coastal fortification ended in 1883. Alarmed at the increase in the size of European navies, Congress authorized the development of a new system of fortifications. William C. Endicott, President Cleveland's Secretary of War, reconvened the virtually defunct Board of Engineers for Fortifications, and Congress approved their recommendations in late 1886. This body, re-named the Board of Ordnance and Fortification, recommended an expenditure of £127 million, the majority of which was to be spent on building concrete fortifications armed with the latest pieces of ordnance mounted on state-of-the-art carriages. Congress approved a greatly reduced version of this plan, and stressed the need to convert existing fortified sites in order to keep costs down. After all, many of these were still sited to cover strategic harbors. The resulting program became known as the Endicott Period of coastal fortification, a fourth phase of fort construction that lasted from 1888 until 1907. The largest incentive for the development of a new breed of harbor defenses was the introduction of large-caliber breech-;loading rifled ordnance; modern guns that far exceeded the firepower of anything Totten and Bernard could have imagined.

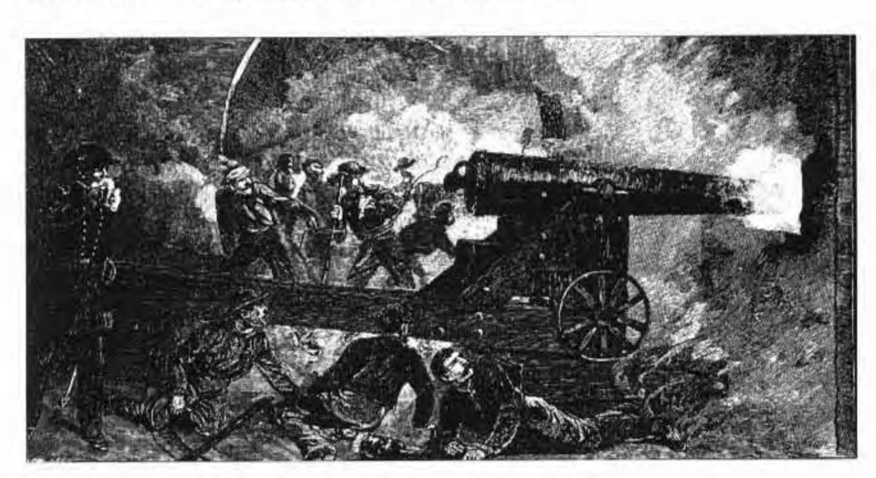
The U.S. Army Corps of Engineers began work on the program in the 1890s, by which time the production of coastal artillery to mount in the batteries was already far advanced. The speed of construction intensified during the Spanish–American War of 1898 and work continued into the early 20th century, encouraged by the military expansion brought about by the Roosevelt administration. In 1905, President Roosevelt convened another Board supervised by his own Secretary of War, William N. Taft. The resultant Taft Program (1907 to 1920) saw the introduction of electrical power, searchlights, extensive modern minefields and fire control centers. By the time the United States entered World War I, her shores were protected by a well-designed and



The rear of a reproduction carriage for a 32-pounder columbiad piece at Fort Delaware, Delaware City, shows how the wheels set at right angles to the lower carriage were designed to run along a metal rail inset into the floor of the casemate when the gun was trained.

integrated coastal defense system. This was powerful enough to be considered a real deterrent to the latest dreadnought warships and also protect the newfound American harbors of the Philippines, Hawaii and the Panama Canal.

Although several Third System forts had been converted to house the new guns of the Endicott Period, and these sites were further developed during the Taft Program, most were left to slumber as forgotten relics of a former age. At Fort Zachary Taylor the top two tiers of the fort were removed during the Endicott Period and the bricks, together with the guns and carriages that had sat behind them, were used as the in-fill for a new concrete glacis. On top of this structure, a concrete terreplein was built to house the new, modern, *barbette*-mounted 12-inch breech-loading guns, which could sweep the approaches to Key West Harbor far more effectively than the old Civil War-era guns. In this case, the price of progress was the virtual destruction of the Third System fort, but elsewhere, the once-powerful fortresses were turned into training camps or barracks, or simply left abandoned. It is only through the intervention of the National Parks Service and interested local historical groups that these structures have remained intact as an important physical reminder of a turbulent period in American history, and as a series of symbols illustrating the fast pace of technology in the mid-19th century.



A heavy 42-pounder columbiad smoothbore, on what appears to be a wartime adaptation of a pre-war casemate carriage. On firing, the gun recoiled backwards, where the incline helped to break the momentum of the recoil.

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In addition, National Parks Service guidebooks are available for most of their properties, while local historians have published several studies of individual forts. These latter studies include the work of James C. Coleman of the Pensacola Historical Society, Colin G. Jameson of Key West, and Robert Arthur, who produced a study of Fort Monroe for the Coast Artillery School (1930).

Glossary

bastion A flanking structure that projected out from a scarp. It usually had two angled faces, and two flanking walls.
caponnier A flanking structure that projected out from the scarp, but of a lower profile than a full-sized bastion. It was usually protected by a stone and earthen roof, although some were topped by open parapets. It was usually pierced with loopholes to permit flanking fire to either side. It also sometimes served as a fortified passageway or gateway structure.
casemate An enclosed gallery-like structure that served to protect a gun battery. Casemate guns fired out of embrasures in the outer wall of the casemate.
chemin de ronde A passage between the detached scarp and an earthen rampart.
citadel An inner fort within the fortification that often served as a barrack room or headquarters building.
cordon The top course of brick masonry on a scarp.
countermine Tunnels dug by the defenders to destroy mines or tunnels dug by attackers during a siege.
counterscarp The opposite side of the ditch from the scarp.
counterscarp gallery A flanking structure built into the counterscarp to permit defensive fire into the ditch or against the scarp if the latter was taken.
covered way The area that surrounded the fort, between the ditch and the glacis.
curtain The section of the scarp that lay between two bastions.
curtain angle The angle between the flank of the bastion and the curtain.
demi-bastion A half bastion with only a single face and a flanking wall. In effect it formed a fortified angle in the curtain.
detached scarp A scarp set some distance away from the rampart. It was also known as Carnot's wall.
ditch The moat around a fort. It was usually a dry moat, although some were designed to be wet (water-filled) moats.
embrasure An opening in the scarp that permitted the deployment and firing of artillery.
en barbette The mounting of artillery pieces so they could be fired over the top of a parapet.
enceinte The main area of fort structure that surrounded a central parade.
exterior slope The earthen slope of a rampart that faced the outside of the fort.
flanking fire Fire directed along or into a moat or curtain that prevented attackers from climbing (escalading) onto the scarp.
glacis The sloped earthen bank outside the covered way. It rose as a shield to protect the body of the fort behind it.
gorge The rear section of the main fortified works.
magazine A well-protected powder and shot storage area. These were usually located underground, or within fortified shelters. Smaller magazines were also used for the storage of arms and ammunition
parade A flat central area within the fort, used as a parade ground, and for drill.
parapet A protective wall on the top of the rampart, capable of being used by sharpshooters.
postern A passage and gate that led into the moat.
rampart A bank of earth designed to protect defenders from enemy fire, and to provide a breastwork to fire from.
ravelin A triangular-shaped defensive work lying outside the main fortification, used to shield the curtain.
redoubt An enclosed fortification that lacked bastions or other structures projecting from the curtain. The term was also used to refer to the barrack block of certain forts, where the buildings formed a single face of the fort without casemate artillery.
revetment The brick facing on the sides of the moat, rampart or covered way.
salient The place where two walls or curtains met at an angle, pointing outwards from the main line of the fortification.
sally port A fortified passageway and gate that served as the main entrance to the fortification.
scarp The outer wall of the fort.
superior slope The top of an earth parapet that sloped downwards
terreplein The area between the parapet and the parade. This could form the top of the main structure of the fortification.
towering bastion A Bastion that was higher than the level of the scarp outside it.
traverse A parapet placed across the width of the terreplein or a covered way to provide protection against flanking fire.
traversing circle (or circle of traverse) The arc prescribed by the rear of a gun carriage when it is moved while aiming at a target.
traversing platform A circular or semicircular platform on which an artillery piece was mounted *en barbette* on the top of a fortification. Guns of this type were designed to traverse (pivot) around a central point.

The fortifications today

The following selection of American coastal fortifications includes most of the major Third System forts, plus other Second System fortifications that played a significant role during the Civil War (1861–65). This included State and National Park Service properties, forts owned by the local community, government agencies and those in private hands. At the time of writing, all these sites are open to the public unless otherwise noted. The forts are listed from north to south.

Fort Knox, Defense of the Penobscot River
Location: U.S. Route One, Bucksport, Maine
Built: 1844–64
Granite-built five-sided fort with two tiers of casemates
Designed for 137 guns. It never saw action
Owner: Fort Knox State Historic Site
Relevant website: fortknox.maineguide.com

Fort Popham, Defense of the Kennebec River
Location: Popham Beach, Maine
Built: 1862, but never completed. Abandoned by 1869
Re-garrisoned in 1898, and in 1917
Small granite-built semi-circular fort designed for three tiers of casemates, but only two were constructed
Designed for 42 guns. It never saw action
Owner: Fort Popham State Historic Site

Fort Gorges, Defense of Portland Harbor
Location: Man-made island on Hog Island Ledge, Portland, Maine
Built: 1848, but never completed. Abandoned by 1869
Granite-built six-sided fort with two tiers of casemates
Designed for 195 guns. It never saw action
Owner: City of Portland, but not open to the public

Fort Preble, Defense of Portland Harbor
Location: Preble Point, South Portland, Maine
Built: 1845–67, never completed
A small granite-built casemate fort. Incorporated existing Second System fort
Designed to mount 62 guns. It never saw action, except for an abortive attempt to prevent a Confederate amphibious raid in 1864
Owner: Southern Maine Technical College

Fort Constitution, Defense of Portsmouth Harbor
Location: U.S. Route 1B, New Castle Island, New Hampshire
Built: 1863–67, but incorporated an earlier Second System fortification
Re-garrisoned in 1898, and in 1917
Masonry-built five-sided fort with single tier of casemates
Designed for 146 guns. It never saw action
Owner: Fort Constitution State Historic Site, but access controlled by U.S. Coastguard
Relevant website:
www.geocities.com/nhfortress/Fort_Constitution/history.html

Fort Warren, Defense of Boston Harbor
Location: George's Island, Boston, Massachusetts.
Built: 1837–61
Large granite fort, fifth largest in the Third System. Shaped as a "squashed" pentagon
Designed for 265 guns. It never saw action
Owner: Metropolitan District Commission. Seasonal ferry service

Fort Independence, Defense of Boston Harbor
Location: George's Island, Boston, Massachusetts
Built: 1834–50, but incorporated an earlier Second System fortification
Granite-built five-sided fort with two tiers of casemates
Designed for 255 guns. It never saw action
Owner: Metropolitan District Commission

Fort Taber (a.k.a. Fort Rodman), Defense of New Bedford
Location: Clark's Point, New Bedford, Massachusetts
Built: 1857–67, but remained incomplete, and incorporated into later works
Granite-built five-sided fort with two tiers of casemates
It never saw action. Owned by the City of New Bedford and access is planned
Relevant website: www.fortrodman.org

Fort Adams, Defense of Narragansett Bay
Location: Brenton's Point, Newport, Rhode Island
Built: 1825–57
Second largest fort in the Third System. Irregularly shaped five-sided granite fort with one tier of casemates (an additional casemate was added to its seaward face. Most extensive and best preserved landward defenses. Large granite redoubt exists
Designed for 464 cannon. It never saw action
Owner: Fort Adams State Historic Site
Relevant website: www.fortadams.org

Fort Trumbull, Defense of Thames River
Location: New London, Connecticut
Built: 1839–50; re-garrisoned in 1898
Small five-sided granite fort with one casemate tier, paired with smaller battery across river at Fort Griswold
Designed for 80 guns. It never saw action
Owner: Connecticut State Park. Fort Griswold is a State Historic Site

Fort Schuyler, Defense of New York Harbor
Location: Throggs Neck, Bronx, New York
Built: 1833–56
Five-sided granite fort with bastions and two tiers of casemates
Designed for 312 guns. It never saw action.
Owner: State University of New York Maritime College. Museum in the fort is open to the public

Fort Totten, Defense of New York Harbor
Location: Willett's Point, Queens, New York
Built: 1863–71
Designed as five-sided granite fort with a double tier of casemates. Only the seaward fronts of the fort were constructed. Known as the Fort at Willet's Point until 1868
Designed for 100 guns. It never saw action.
Owner: City of New York Parks Department, currently not open to the public

Fort Richmond, Defense of New York Harbor
Location: Verrazano Narrows, Staten Island, New York
Built: 1847–64, renamed Fort Wadsworth in 1865
Four-sided granite fort with tiers of casemates and one *barbette* tier
Designed for 116 cannons. It never saw action
Owner: Gateway National Recreation Area, National Park Service

Fort Tompkins, Defense of New York Harbor
Location: Verrazano Narrows, Staten Island, New York
Built: 1847–1868
Large granite fort. Shaped as an irregular, five-sided work with two levels of casemates, but no embrasures
Designed for 42 guns. It never saw action.
Owner: Gateway National Recreation Area, National Park Service

Fort Delaware, Pea Patch Island, Delaware River, Delaware
Location: Pea Patch Island, Delaware
Built: 1831–59
Five-sided brick-built fort, with two tiers of casemates
Designed for 175 guns. Used as a prison camp during the Civil War, 1861–65
Owner: Fort Delaware State Park. Seasonal ferry service from both the Delaware and New Jersey sides of the rivers
Relevant website: www.del.net/org/fort

Fort McHenry, Defense of Baltimore Harbor
Built: 1823–36, incorporating earlier Second System Fortification
Granite-built five-sided fort with two tiers of casemates
It never saw action
Owner: Fort McHenry National Monument, National Park Service
Relevant website: www.nps.gov/fomc

Fort Carroll, Defense of Baltimore Harbor
Location: Soller's Point Flats, Patapsco River, Maryland
Built: 1847–65, not completed
Six-sided masonry-built fort with single tier of casemates built on a man-made island
Designed for 225 guns. It never saw action
Owner: Private owners, not open to the public
Relevant website:
www.geocities.com/baltforts/Fort_Carroll/index.htm

Fort Washington, Defense of Potomac River
Location: Potomac River, Fort Wahington, Maryland
Built: 1814–46, incorporating earlier Second System fortification
Five-sided masonry-built fort with single tier of casemates
Designed for 55 guns. It never saw action
Owner: Fort Washington, National Park Service
Relevant website: www.nps.gov/fowa

Fort Monroe, Defense of Hampton Roads
Location: Old Point Comfort, Hampton, Virginia
Built: 1819–37
Largest of all the Third System forts. Six-sided granite built fort with very large, open bastions. One tier of casemates, one level for barbette, as well as additional external batteries.
Designed for 585 guns. It saw during the Peninsular Campaign of 1862

Owner: Fort Monroe U.S. Army Reservation, Casemate Museum in fort open to the public
Relevant website:
www.fort.monroe.army.mil/museum/

Fort Calhoun, Defense of Hampton Roads
Location: Rip-Raps Shoals,Hampton, Virginia
Built: 1820, but never completed. Abandoned in 1867
Renamed Fort Wool in 1862
Small granite-built circular fort with three tiers of casemates, but only one casemate tier was built
Designed for 216 guns. It saw action during battle between the *Monitor* and *Merrimac* in 1862
Owner: Fort Wool City Park, City of Hampton Park, seasonal ferry service

Fort Macon, Defense of Beaufort Inlet
Location: Bogue Baks, Beaufort, North Carolina
Built: 1826–34
Five-sided brick-built fort with one tier of casemates, but cannon were only mounted on the *barbette* level.
Designed for 51 guns. Besieged and captured in March 1862. Fort Macon State Park
Relevant website:
www.ils.unc.edu/parkproject/visit/foma/home.html

Fort Caswell, Defense of Cape Fear River
Built: 1827–38
Small five-sided truncated hexagon masonry fort, without bastions, but three pairs of caponiers
Designed for 64 guns, all on the *barbette*. Saw action during attack on Fort Fisher in 1864–65
Owner: Baptist Retreat Center. Open to visit upon appointment.Relevant website:
www.geocities.com/ncforts/Fort_Caswell/index.htm

Fort Sumter, Defense of Charleston Harbor
Location: Man-made island, Charleston Harbor, South Carolina
Built: 1829–37
Five-sided brick-built fort, with two tiers of casemates
Designed for 135 guns. Saw action throughout Civil War, 1861–65
Owner: Fort Sumter National Monument, National Park Service
Relevant website: www.nps.gov/fosu

Fort Moultrie, Charleston Harbor, South Carolina
Built: 1828–34, incorporating earlier Second System fortification
Small five-sided brick-built fort, with open battery
Saw action throughout Civil War, 1861–65
Owner: Fort Moultrie National Monument, National Park Service
Relevant website: www.nps.gov/fomo

Fort Pulaski, Defense of Savannah River
Location: Cockspur Island, Savannah, Georgia
Built: 1829–47
Five-sided brick-built fort, with one tier of casemates
Designed for 146 guns. Besieged and captured in April 1862
Owner: Fort Pulaski National Park, National Park Service
Relevant website: www.nps.gov/fopu

Fort Clinch, Defense of St. Mary's River
Location: Key West, Florida
Built: 1846–66
Four-sided brick-built fort, with two tiers of casemates, not used for seacoast artillery
Designed for 70 guns on the *barbette* level.
Abandoned and captured, February 1862
Owner: Fort Clinch State Park, Florida State Parks
Relevant website:
www.cr.nps.gov/goldcres/sites/ftclinch.htm

Fort Marion, St. Augustine, Florida
Built: 1672, but modified in the Third System period
Originally called Castillo de San Marcos until renamed in 1825
Four-sided stone-built fort with open battery
Abandoned and captured, March 1862
Owner: Castillo de San Marcos National Monument
Relevant website: www.nps.gov/casa

Fort Zachary Taylor, Defense of Key West
Built: 1846–54
Four-sided brick-built fort with two tiers of casemates
Designed for 179 guns. Held by the Union throughout war
Owner: Fort Zachary Taylor State Park, Florida State Parks
Relevant Site:
www.dep.state.fl.us/parks/district5/fortzacharytaylor/index.asp

Fort Jefferson, Defense of the Florida Strait
Location: Garden Key, Dry Tortugas, Florida
Built: 1846–67
Third largest Third System fort. Six-sided brick-built fort with two tiers of casemates, covers most of Garden Key. Parade ground alone covers 17 acres
Designed for 450 guns by the Union throughout the war
Owner: Fort Jefferson National Park, National Park Service
Relevant website: www.nps.gov/drto

Fort Pickens, Defense of Pensacola Bay
Built: 1838–44
Five-sided brick-built fort with single tier of casemates

Designed for 120 guns. Held by the Union throughout the war
Owner: Gulf Islands National Seashore, National Park Service
Relevant website: www.nps.gov/guis

Fort Barrancas, Defense of Pensacola Bay
Location: Pensacola Naval Air Station, Pensacola, Florida
Built: 1839–44
Four-sided brick-built fort with single tier of casemates and a water battery
Designed for 45 guns. Operational during siege of Fort Pickens, then abandoned to Union forces, May 1863
Owner: Gulf Islands National Seashore, National Park Service
Relevant website: www.nps.gov/guis

Fort McRee, Defense of Pensacola Bay
Location: Foster's Bank, Perdido Key, Florida
Built: 1838–44
Curved oblong brick-built fort with two tiers of casemates
Designed for 96 guns. Operational during siege of Fort Pickens, then abandoned to Union forces, May 1863
Owner: Fort is completely destroyed and is underwater
Relevant website: www.nps.gov/guis

Advanced Redoubt, Defense of Pensacola Bay
Location: Bayou Grande, Pensacola, Florida
Built: 1845–59
Four-sided brick-built fort with rifle galleries, mounted 15 heavy guns in *barbette* positions
Operational during siege of Fort Pickens, then abandoned to Union forces, May 1863
Owner: Gulf Islands National Seashore, National Park Service, open at certain times
Relevant website: www.nps.gov/guis

Fort Gaines, Defense of Mobile Bay
Location: Dauphin Island, Alabama
Built: 1853–61
Five-sided brick-built fort with intermittent single tier of casemates. The fort was designed to use *en barbette* guns
Designed for 60 guns. Operational during the Battle of Mobile Bay, August 1864
Owner: Fort Gaines State Park, Alabama State Park
Relevant website:
andy_bennett.home.mindspring.com/coastal.html

Fort Morgan, Defense of Mobile Bay
Location: Mobile Point, Alabama
Built: 1819–34
Five-sided brick-built fort with one tier of casemates
Designed for 65 guns. Operational during the Battle of Mobile Bay, August 1864
Owner: Fort Morgan State Park, Alabama State Parks
Relevant website:
andy_bennett.home.mindspring.com/coastal.html

Fort Massachusetts, Defense of Mississippi Sound
Location: Ship Island, Mississippi
Built: 1859, and never finished. Abandoned in 1867
Unfinished brick-built casemate battery with a circular scarp
Designed for 37 guns. Abandoned to Union forces in early 1862
Owner: Gulf Islands National Seashore, National Parks Service
Relevant website:
andy_bennett.home.mindspring.com/coastal.html

Fort Pike, Lake Borgne, near New Orleans, Louisiana
Location: Pass Rigolets, Lake Pontchartrain, Louisiana
Built: 1819–26, abandoned in 1871
Three-sided brick-built fort with one tier of casemates and central citadel
Designed for 40 guns. Abandoned to Union forces in early 1862
Owner: Fort Pike State Park
Relevant website:
www.crt.state.la.us/crt/parks/fortpike/fortpike.htm

Fort St. Philip, Mississippi River, Louisiana
Built: 1819 –67, rebuilt in early 20th century
Five-sided brick-built fort with two tiers of casemates, with central citadel
Participated in the Battle of New Orleans, April 1862
Abandoned to Union forces in early 1862
Owner: Private hands. Not open to public

Fort Jackson, Defense of Mississippi River
Location: Plaquemines Bend, Buras, Louisiana
Built: 1822–32
Six-sided brick-built fort with one tier of casemates and central citadel
Designed for 97 guns. Participated in the Battle of New Orleans, April 1862
Abandoned to Union forces in early 1862
Owner: Fort Jackson Parish Park, Plaquemines Parish

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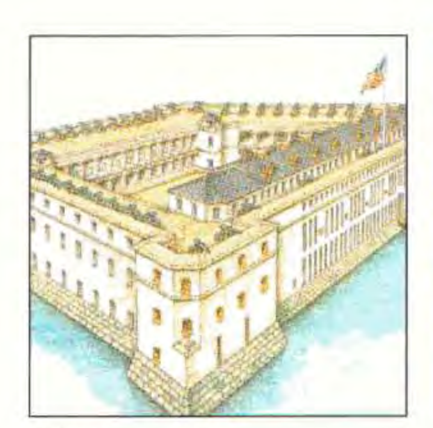
Fortress • 6

Design, technology and history of key fortresses, strategic positions and defensive systems.

American Civil War Fortifications (1)

Coastal brick and stone forts

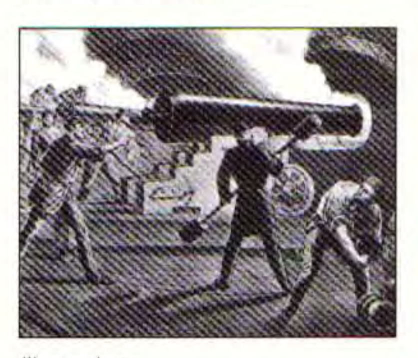
The 50 years before the American Civil War saw a boom in the construction of coastal forts. These stone and brick forts stretched from New England to the Florida Keys, and as far as the Mississippi River. At the start of the war some were located in the secessionist states, and many fell into Confederate hands. Although a handful of key sites remained in Union hands throughout the war, the remainder had to be won back through bombardment or assault. This book examines the design, construction and operational history of those fortifications that played a crucial part in the course of the Civil War.



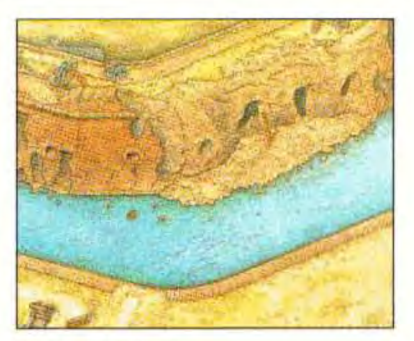
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